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HELP US KEEP PRICES DOWN

A United States war message prepared by the War Advertising Council, approved by the Office of War Information, and contributed by the Magazine Publishers of America

11049

Nature in Print

By HOWARD ZAHNISER

THOSE who have had the privilege of reading the Smithsonian Institution War Background Studies can well appreciate the wealth of knowledge, applicable to almost any emergency, which has been stored up in institutions that are often too lightly thought of as mere museums for the amusement and amazement of visitors. Dr. Alexander Wetmore, Assistant Secretary of the Smithsonian, has said that there are "throughout the world more than seven thousand museums, of which more than a thousand are in the United States." Roy Chapman Andrews, in his recent autobiographical book aptly entitled *Under a Lucky Star,* declares it to be his belief that the American Museum of Natural History "is one of the most worthwhile institutions in all the world." Thomas Barbour, in *Naturalist at Large,* also recently published and in a nice coincidence with the volume by Dr. Andrews (whose life has been strikingly parallel with Dr. Barbour's), adopts the declaration of Dr. Andrews's successar that "the continued growth and development of cultural and educational institutions" is "one of the most essential duties which can be borne in our nation today, second only to the duty of those defending our right to have the civilization we want." These words of Dr. Albert Eide Parr are of current importance, and they may well sound an overtone for the reading of *Under a Lucky Star* and *Naturalist at Large.*

These volumes, however, are not lifeless exhibits to be taken up with a dull, serious purpose. They are exciting. They are the life stories of great scientists who have traveled widely and adventurously. Roy Chapman Andrews, at twenty-two years of age, came from Beloit, Wisconsin, to the American Museum of Natural History in New York City and at his first job swept laboratory floors. Soon he was studying whales, and it was not long until he had found his way to far places. Before his retirement in 1941 he had achieved national fame as the leader of Gobi Desert explorations, and supreme recognition as the Director of the institution the floors of which he once swept. His adventures, recounted in *Under a Lucky Star* in a racy prose, would provide the "material" for radio dramas more exciting than those which now keep children from their dinners and restful slumber. He describes his book as "a kaleidoscopic picture of my life", and he concludes the volume with the statement: "I loved living it and it has been almost as much fun to write the story. Always there has been an adventure just around the corner—and the world is still full of corners!"

Thomas Barbour, Director of the Museum of Comparative Zoology at Harvard, which he says is "widely and very happily known as the Agassiz Museum", has, like Dr. Andrews, been as much interested in excursions from Cambridge as he has been in developing there the most useful sort of museum. In fact he prefaces his reminiscences with a touchstone quotation from Robert Burton's "The Anatomy of Melancholy": "Peregrination charms our senses with such unspeakable and sweet variety that some count him unhappy that never travelled—a kind of prisoner—and pity his case." No one need pity the case that Dr. Barbour presents, and many will, in fact, envy him. All who read his book will enjoy the humor and excitement of his many adventures. His first and longest expedition took him to India, Burma, French Indo-China and the East Indies and turned out to be his honeymoon also—with a wife who could tease a cobra with an open umbrella while her husband lay in front of the deadly snake to get a picture "which would fill the whole plate." Later expeditions took Dr. Barbour to South America, Africa, and often to the West Indies and to the tropical island laboratory he helped establish on Barro Colorado Island in Panama.

The interest of narrative in both *Under a Lucky Star* and *Naturalist at Large* is not unaccompanied by an interest in the discoveries of these explorers, and their readers will find their own stores of knowledge enriched. Dr. Andrews has written the faster moving volume and the one more noted for excitements of adventure and of success in astounding enterprises. Dr. Barbour's writings are more discursive, more like intimate conversations than strange tales, and a reader's understanding of the author's personality and that of his associates is the better established. *Under a Lucky Star* is an autobiography of events. *Naturalist at Large* is one of personality. They are enough alike to be read together with an increased interest. They are different enough to be read consecutively without monotony. Unfortunately they are alike in lacking an index "in condign punishment of which", Paul H. Oehser has written, "I hope the two publishers concerned will be infested with printers' lice, bookworms, and acute literary disintegration." He might have added appendicitis, and yet he would doubtless agree that even with the irritation of the missing index we have an appreciation for the discriminating enterprise of publishers who bring us in these times works like *Naturalist at Large* and *Under a Lucky Star.*

By each, and especially by both together, many readers will be aroused to wonder as to how the achievements of such men are to be continued in the future. As Dr. Barbour says "the museum is like the library. It has got to keep growing; otherwise its significance ceases." Yet it is apparent—especially in Dr. Andrews's work—that the almost all-important financial support of these institutions is no longer what it was during the careers of the "Naturalist at Large", or of the scientist who travelled under a lucky star, partly because he was so adept at touching the sources of wealth in the pockets of American rich men. It was largely the change from the profligate circumstances making this possible that led to Dr. Andrews's retirement.

"We were the victims," he writes, "of war and taxes

Promise

By PAUL CHURCHER

This pledge I made, when I awoke from building
Some dreamed-of castle far across the sea,
And found that I must strain to hear the raindrops:
A roof of tin shall on my castle be.

along with other institutions of a similar kind. * * * Everything had changed. Nothing in our lives would be the same again. All educational institutions must face radically different problems, must adapt themselves to a 'new order'."

Dr. Andrews does not suggest the way in which such an adaptation can be made, and, in fact, he resigned at least in part because, as he says, "A younger man able to adjust himself and his ideas to the aftermath of the war was needed." It is a concern of all of us that such adjustments be made. If our rich men are no longer rich enough to support our museums in the future, if taxes take from them the wealth that explorers like Roy Chapman Andrews once used to finance their scientific work, then all of us in some other way must see that the needed funds are provided.

We need have less worry as to our naturalists, in the immediate future, at least. They, of course, will not duplicate the careers of Roy Chapman Andrews or Thomas Barbour, but in accordance with their own genius they will continue to enrich our knowledge and understanding of the natural world. Oliver Wendell Holmes once used the phrases "passionate curiosity" and "passionate awe" to describe such interests of scientists. We seem assured, for yet a time, of naturalists with such passions whose experiences we may all share.

Such hopes and faith are well substantiated by Edwin Way Teale's recent autobiographical work entitled *Dune Boy: The Early Years of a Naturalist.* It is a charming and interesting book, an idyll of an alert young boy's life with his grandparents in the sand dunes of Indiana—his adventures in understanding people as well as in acquiring a knowledge of the world of the outdoors. *Dune Boy* is delightfully written, and it catches the nostalgia we all feel for the years that are too far away, and the places where we once wandered with young curiosity and awe. The thrills of experiments with a self-made airplane, the excitements of boyhood adventures in the outdoors, the youthful satisfactions and disappointments with farm enterprises, and the joys and coziness of the Christmas season with grandparents, are all engagingly recreated in *Dune Boy,* which itself will add joy and coziness to the Christmas of the many who during the years to come may receive it. At the same time it is a valuable chronicle of the development of Edwin Way Teale, whose present and promised accomplishments as a naturalist and writer are of importance to all of us who are concerned with the future of our own special interests in the world of the naturalists.

Dune Boy: The Early Years of a Naturalist. By Edwin Way Teale. New York. Dodd, Mead & Company. 1943. 255 pages, with 30 drawings by Edwin Shenton. $3.

Naturalist at Large. By Thomas Barbour. Boston. Little, Brown and Company. An Atlantic Monthly Press Book. 1943. 314 pages, with 43 photographs on 22 plates. $3.50.

Under a Lucky Star: A Lifetime of Adventure. By Roy Chapman Andrews. New York. The Viking Press. 1943. 300 pages, with endpaper map by Sol Immerman. $3.

Bird Watching

A Guide to Bird Watching. By Joseph J. Hickey. New York. 1943. Oxford University Press. Illustrated by Francis Lee Jaques. 262 pages. $3.50.

This is, we believe, the first time that anyone has attempted in a full-length book to set down the manners and methods of bird study. It may seem, off-hand, that to watch birds you just go out and watch them, but it is not as simple as that, as Mr. Hickey's book reveals. He includes material on learning bird names, identification in the field, learning bird songs, and keeping notes and records. There are chapters on migration, bird banding, bird counting and all other phases of what is a far from simple activity, even if followed as a hobby. Mr. Hickey has brought between covers a vast amount of practical, valuable and interesting material, hitherto scattered about in many bird books. His guide is a distinct and important contribution to the ornithological library and will be of vast assistance to those who wish to get the most out of field work with birds.

Warmth of the Hearth

Hearth-Fire. By Marel Brown. Nashville, Tennessee, 1943. The Broadman Press. 104 pages. $1.00.

Many poems of Nature find their place in this second book of poems by Marel Brown. Her first collection between covers bore the title *Red Hills* and was enthusiastically received. This second little book should enjoy an equally approving acceptance.

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To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great National Resources of America

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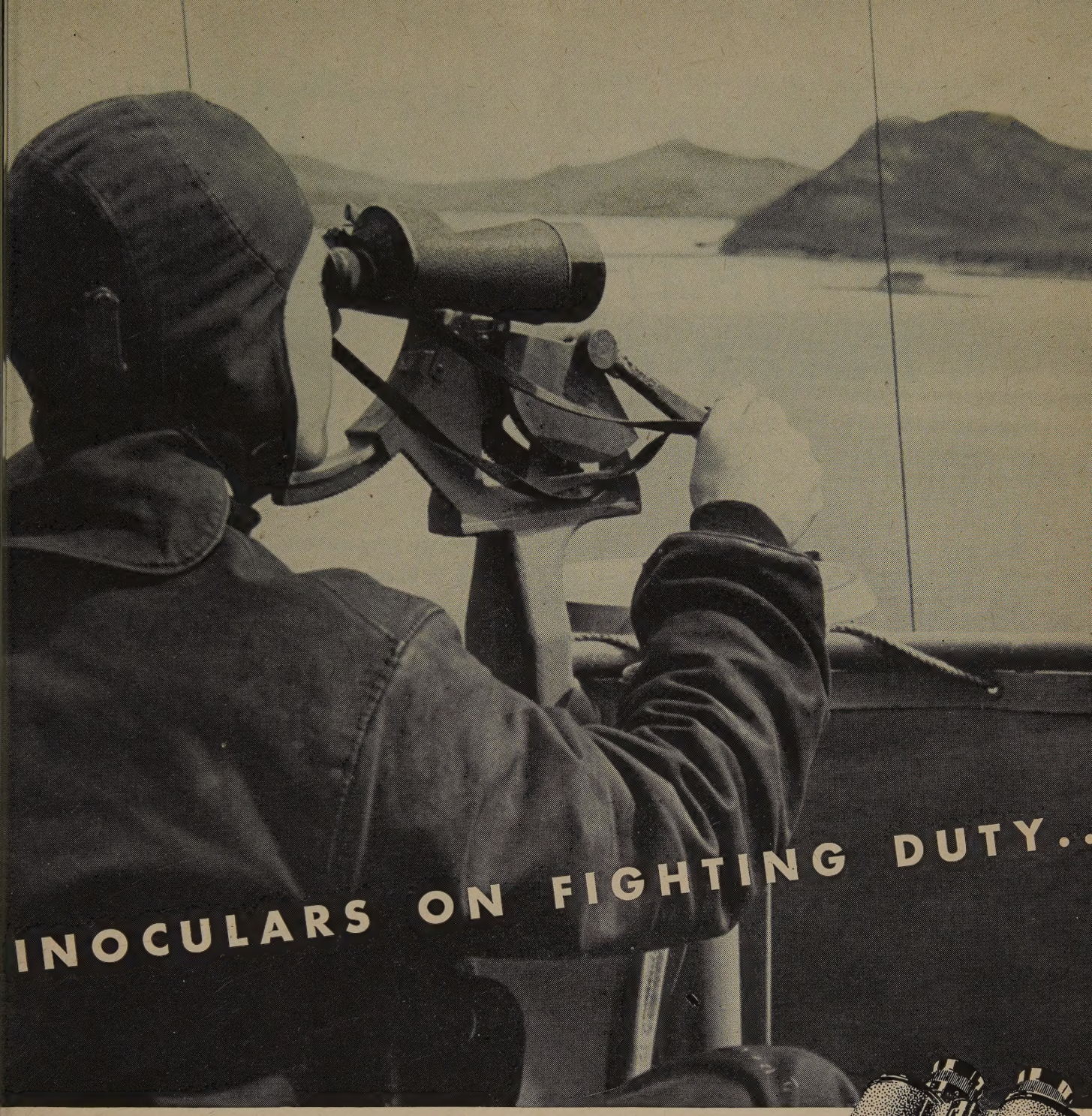

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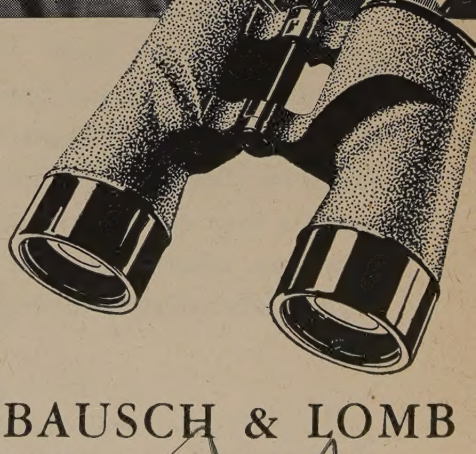

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At present—and this started before Pearl Harbor—its trained scientists and engineers and all their skilled associates are concentrating on products of importance to our armed forces. But when this work is happily over they will be ready to continue their developments for the needs of peace.

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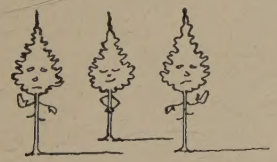
"Research is an effort of the mind to comprehend relationships no one has previously known; and it is practical as well as theoretical." . . . . . BELL TELEPHONE LABORATORIES

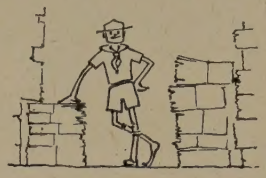
Contents Noted

Life on a submarine is something that, with our touch of claustrophobia, we would not enjoy. Now we learn that it is complicated by noises made by the purring, tooth-grinding, drumming and grunting of fish, noises that may be confused with the undersea sounds of the screws of an enemy battleship or merchantman. Recordings of these fish noises have been made to train submarine crew members to distinguish them. An ugly, bad-tempered fellow, the toadfish, for example, has a voice of volume, sounding like a steamboat whistle under water. A crowd of croakers set up a raucous drumming by vibrating a bandlike muscle against the air bladder, which is an inflated sac located just back of the head region. Black drums make such a racket that fishermen say that it sounds like someone thumping on the bottom of their boats. Why the fishes go in for drumming, grunting and grating is anyone's guess, but some fishes do, both in salt and fresh water, all over the world.

Nineteen hundred and forty-four carries us into the third year of our participation in the war. It is possible to look back over the past two years and realize that war demands upon our renewable natural resources have been moderate. The unfortunate early emphasis on game as a source of food—an emphasis leading toward reopening the door to commercialization—has somewhat abated. Inroads into National Parks have been few. The War Department has cooperated fully by recognizing the importance of preserving the conservation program of parks, forests and wildlife refuges. Most recent reassuring development is the virtual removal of the threat to the Sitka spruce of Olympic National Park. Increased production of British Columbia and Alaska spruce and of aluminum has solved the problem.

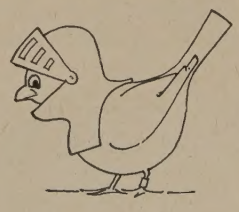


The year now bowing out has been fraught with problems for the editors and business managers of publications. These have involved manpower in the offices, printing plants and engraving shops; materials; paper. America's magazines have done a notable cooperative job in cutting their paper consumption and are continuing this in meeting the latest paper cut, which now reduces paper available to magazines to seventy-five per cent of that used in the basic period. Civilians have little idea of the tremendous wartime demands for paper for everything from targets to packing boxes. Paper conservation is a vital part of the war effort. Ten million tons of salvaged waste paper is the 1944 goal. Be saving of paper. Cooperate with whatever agencies in your community are collecting waste paper.



Secretary of the Interior Harold L. Ickes is a self-styled curmudgeon, so he undoubtedly was glad to be in character in a statement telling boys coming back from certain fronts not to bring any pet parrots with them. This goes also for lovebirds, cockatoos, lories, lorikeets and other members of the parrot family. Permits and a long quarantine are required by the regulations. The trouble is, of course, that these birds may be infected with psittacosis, a dread disease that humans can catch from parrots. The law also forbids importation of a considerable list of other birds and mammals, including skylarks, chaffinches, Pharaoh's rats and fruit bats. And, above all, do not get your heart set on having your boy bring back any members of the family Pteropodidae.

We have heard a lot about the shortage of sporting arms ammunition, but there seems to be enough about for the use of those gunners who shoot at anything just for the sake of killing. Members of racing pigeon clubs complain of birds coming home with bird shot in them, and of others not coming home at all, some unquestionably shot down in flight. Breeders and trainers of carrier or homing pigeons have been furnishing the War Department with birds and heedless gunners are sabotaging the war effort in a small but vital manner by such inexcusable shooting.



As we start the twenty-second year of Nature Magazine we are happy to salute many readers loyal 21 years.

—R. W. W.

". . . the hairy woodpecker's steady hammering was a distinct reminder that one community among winter's wildfolk remains unperturbed . . . and continues busily at work through the woodland's ghostly peace."

Although many birds have sought refuge by migration, one lively woodland community remains—

During the Long Snowfall

Photographs by the Author

By JOHN LINDSEY BLACKFORD

SNOW was falling silently, incessantly, interminably, in the heavy forest. Only the occasional soft slipping of white burdens from weighted branches, or the less frequent snap of a breaking bough, interrupted the hush of the long snowfall. Yet, as I pushed on along the indistinct trail, snowshoes sinking deep in the feathery mantle, I heard a different although familiar sound of the winter woods, the repeated, brisk *tap, tap, tap* of a woodpecker at work. There followed the sharp, warning *peek* of a northern hairy; and the black and white clad ranger of our timberlands swooped down from his scaly tree trunk and off in the bounding flight that quickly lost him among the driving flakes.

Save for such minor notes as only accent its stillness, a great silence prevails in the northern forest during the coming of the deep snows. Deer may move more freely through the white, swirling curtain; but many other woodfolk suspend or curtail their activities as the deep, fluffy blanket is laid. Few calls sound in the boreal forest. Great birds are little on the wing. The smallest fourfoots are buried beneath the crystal coverlet. Most grouse are hid high in dense evergreens. Pine squirrels keep close to their caches of cones, and generally lack temerity to break the pervading peace.

Yet the hairy woodpecker's steady hammering was a distinct reminder that one community among winter's wildfolk remains unperturbed by this deathlike stillness, and continues busily at work through the woodland's ghostly peace. It is the cheerful, industrious, woodworking fraternity—the happy, rollicking chickadee-woodpecker clan. Now, while the wild is uncommonly silent and the cold grows less intense, we have good opportunity to renew acquaintance with these roving residents of the northland; and to discover among them their snowtime friends, some of whom we may never have met. For, until we become aware of the argent beauty of the winter wilderness, only such boon companionship might lure us into the storm.

It is, of course, that personable little acrobat, the black-capped chickadee, who is the jolly ringleader of these animated bands. To see his magnetism really demonstrated, go among his own crowd, the small fry of the winter woods. Visit the snow-mantled evergreens on the valley ridges, slide down among the white-laced birches in the ravines, and tell me if you ever find a chickadee alone. Even an entire troop of the cheery chaps may seldom be found without other company besides their own busy crowd.

"Only the occasional soft slipping of white burdens from weighted branches, or the less frequent snap of a breaking bough, interrupted the hush of the long snowfall."

As we search the white-blanketed forest, and are about ready to declare it deserted, there comes the sweet *dee dee dee* of a care-free company. At intervals the approaching chorus of merry notes is punctuated by the purposeful drilling of a woodpecker worker, or the lighter tapping of "Nutty," the white-breasted nuthatch. Presently they are all about as they drift through the understory of the wood.

The chickadees are frolicking amid the smother of falling flakes, actually enjoying the storm. Excitedly aware that deep winter has come to the wild, these confirmed optimists greet the occasion with celebration and even with song. Peering and prying, clinging and swinging, they scramble over and under and through the interlaced boughs of firs, hemlocks, and pines, the merriest midgets of this white winter world.

Among their roving ranks we glimpse all manner of feathered comrades. To the nasal *squank, squank* of Nutty is added the thin fluting of his small, stubby cousin, the red-breasted nuthatch. This talkative pair may soon be discovered hitching head-foremost down the nearest tree trunk. Down in the bottomlands, in deciduous growth along streams, where is Black-cap's favorite rendezvous, downy woodpecker joins the playful parade. Flaunting a scarlet nape patch, he peeks brightly around a white-trimmed alder bole, before striding busily upward in search of hibernating beetles and larvae. Infrequently an amiable flicker keeps in loose touch with the troop as he bounds along through the upper terraces of the wood. His piercing *scape* and colorful flash of underwings may sometimes lead one to just such a companionable crew; either below him under guardianship of tall, bare cottonwoods, or adventuring through midzone and undercover of mixed broadleafs and conifers.

". . . that personable little acrobat, the black-capped chickadee, is the jolly ringleader . . ."

Where the range of a chickadee flock embraces the latter forest type, and adjoining dark evergreens mantling the foothills, a pair of Rocky Mountain creepers will likely be among its closest associates. Unseen in dim depths of the higher timber at other times of year, the creepers remain unknown to most of us even after their descent to neighboring valley woods. The brown, the Sierra and other "creeps" are just as enamored of their lively chickadee friends as are other comrades; yet so obscure are their habits and so drab their dress, that they may accompany these celebrities and never gain notice. Even their notes, thin, high-pitched *screeps* from the frosty forest depths, do not readily distinguish them from others in the sprightly chickadee train.

Yet I have found them more interesting than many among these small, cosmopolitan crowds. With the exception of red-breasted nuthatches, they keep, I believe, closer company than any with their sociable, light-hearted friends. Always within "screeping" distance of each other, often together upon the same lichen-patterned trunk, a couple will commonly be found in the scattered midst of the frolicking foragers. They are more definitely paired than any of the others through the cold winter season. With weak, shrill *tsi tsis* as they fly, they do their miniature best to maintain the enthusiasm of the joint expedition.

Flattened to the corky boles of firs, or microscopically inspecting bark curls of the birches, creepers spiral up and around the tree trunks. Their slender feet are incapable of the topsy-turvy, head-down clambering of nuthatches; even the jerky, backward descent of "Woody" Woodpecker cannot be duplicated, regardless of how well wedge-shaped tail feathers propped them on the way up. But there are two alternatives: a timid and tentative downward sidling that permits of a few inches reverse; and in case the creviced bark is so extremely promising that

it simply must be examined over again, a creeper will drop to the occasion. The performance is neatly done. A fast turn and vertical dive straight down within an inch or two of the trunk; before you know it he has righted himself, clutched the bark, and is on the way up. I watched one plunge swiftly ten feet in this expert fashion down the straight stem of a canoe birch, although usually the distance retraced is but three feet or four.

In the redwoods, and misty, moss-draped coastal forests, this tiny, tawny, rusty-clad inspector of the bark chums with inquisitive chestnut-backed chickadees.

Confusing when heard with wiry notes of the creepers and lisping improvisations of Black-Cap, are certain other shrill *tzee tzee ees* emanating from the whirling, white shroud of the storm. We suspect that they come from sheltered interiors of the tented, silver - wrapped conifers bending now under the weight of the snow.

In clear weather you may search with glasses through the lofty ceiling of the forest, or in the maze of tangled undercanopy close about, and never succeed in identifying the singer. It is as characteristic of this fairy performer that he now appears just above you, spying from needled "windows" on the heavily mantled spire of a fir. You recognize the sprite-like golden-crowned kinglet by his gilded coronet, brightened by its medial daub of flame. The elf flits away through the feathery flakes, pausing to hang momentarily in mid-air, butterfly-like at the clustered tip of a branch.

Once I observed a dainty female kinglet, alone of her kind, keep hilarious chickadee company all the long winter months. But usually kinglet allegiance is given first to their own active, more compact flock. In cold weather the group fraternizes with our popular blackcaps, while through warmer days the fairy troubadors range separately from them, and more widely than they do.

In the West, frisky mountain chickadees unite with black-capped flocks that range along the borders of the higher spruces, lodgepoles and firs. Each is readily distinguished by a narrow, white line over a beady, mischievous eye. *Tsik-a!* one warns, swinging head down on a twig trapeze when we loom through the deceptive flakes; then *tsee dee,* chuckling at his own mistake at thus greeting old friends.

Downy woodpecker drops out of bands touring dense and unbroken conifer stands. Here his larger, more retiring cousin, the hairy, becomes a steadfast recruit. The big fellow lags behind his husky-voiced mountain chickadee friends when some attractive grub-filled stub demands prolonged attention; but depend on it, he speedily catches up again. The loud, industrious tapping that originates with him may come from anywhere in their vicinity; on the low, furrowed butt of a fir, the scarred stem of an aspen, or from the towering dead spars of the giant tamaracks.

"Flattened to the corky boles of firs, or microscopically inspecting bark curls of the birches, creepers spiral up and around the tree trunks."

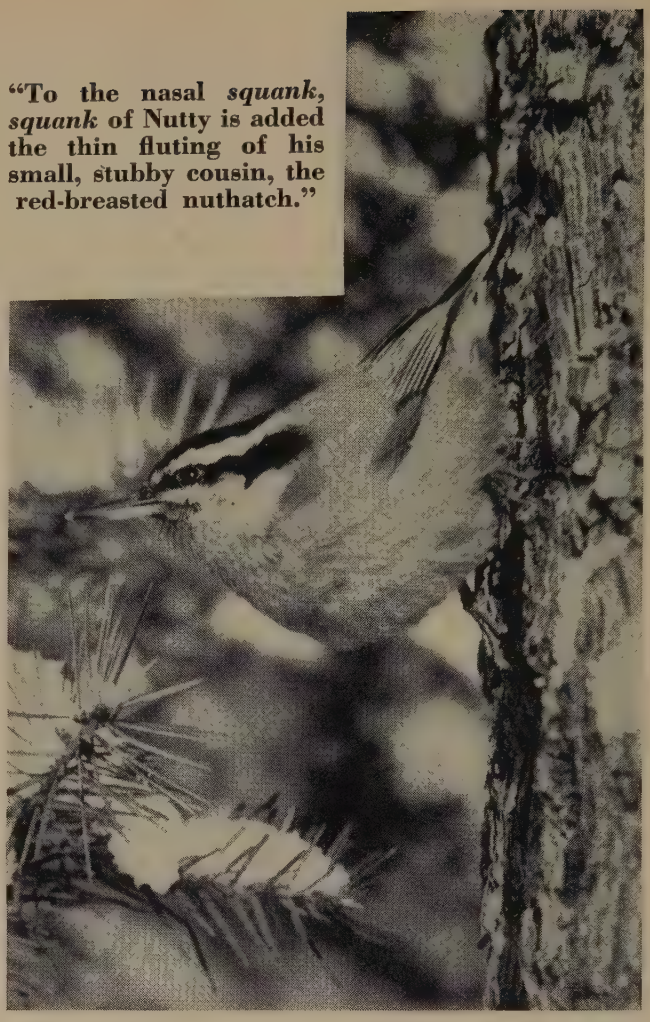
Nutty, too, keeps looser contact with the chickadee cheerleaders than creeper or kinglet, though he is with them for a greater part of the year. He is particularly partial to scouting the mid-levels of the timber, while they pass inspection on the secondary layer and shrub stratum beneath. Sometimes all hands join in a romp through the roof of the forest.

Across stately, park-like yellow pine lands, the crowd is augmented by a diminutive, bob-tailed member of the "gang," the pygmy nuthatch. This cheeping midget tumbles recklessly about amid the swaying needle-clusters of the pine boughs, his especial domain. Hairy woodpecker too is a booster of these excursions among the scaly, rust-red columns of the mighty ponderosa pines.

Where clinging mists

from off the Pacific replace our swirling snow, chestnut-backed chickadees preside as impresarios of many happy clans. *Kiss-a-dee dee* is their affectionate greeting to you! Sitka kinglets, Hutton vireos, and Bewick wrens are enlisted among their Lilliputian recruits. Sometimes a towhee rallies to the versatile leadership of these friendly little folk.

When burly Winter blusters across the Southwest, Cassin purple finches and red-backed juncos descend into river cottonwoods to troop with white-breasted woodpeckers and slender-billed nuthatches. As we might expect, those champions of cheer, the chickadees, maintain there an enthusiastic esprit de corps. Among the dwarfish oaks, their relatives the bridled titmice gambol with gray titmice and diminutive lead-colored bush - tits. Later, in summer, ever mindful of their responsibility, mountain chickadees will lead black-throated gray warblers, gray titmice and Baird wrens among the gnarled junipers, straggling cliff roses, and pinyon pines fringing the Grand Canyon rim. Even bluebirds, crossbills, and Audubon warblers may be counted in their summertime train.



"To the nasal *squank, squank* of Nutty is added the thin fluting of his small, stubby cousin, the red-breasted nuthatch."

Yet back in our white northern forest, where snow eddies around the ermine-clad spires of great evergreens, an even more interesting tribute is paid to chickadee cheer. Tagging along in their wake, or raucously startling the woodland ahead, a crested jay may attach himself to our sociable band. His boisterous rattle surpasses a similar hearty effort on the part of hairy woodpecker. But his hawk-like scream does not turn a feather on anybody's head. They know the rascally trick. They have even forgotten his past misdemeanors, and in such tolerant company the jay is his uninhibited self, both rowdy wag and elegant dandy. Streaking past, like a blue monoplane through the white-robed forest, he perches importantly on a cowled conifer nearby. Presently the woodfolk have his expert assurance that we are neither owls nor other similar shady characters, and we can continue our hike in company of the midget merrymakers, who have known as much all along.

Pushing through the soft, knee-deep blanket, during a long, silent fall of the snow, I first noticed the awkwardness of a hairy woodpecker clambering over the slanted, slippery bole of a birch. The glasses finally told me her story. She had but a single foot. The other leg, merely a shortened stub, was left that way likely by some wanton shot. The bird climbed courageously yet with difficulty. Masterfully she would straighten and brace herself upon the rough trunks; then fall to persistent hammering and prying at the bark while she clung desperately with her few clawed toes. On the wing, of course, she kept pace very well with her lively companions. I saw her with them often during the late winter months. All could readily survive the deepening snow. But the merciless frost that struck suddenly, and seized the shivering forest in its frigid grasp, demanded the utmost of fortitude. That she triumphed over her handicap and the unrelating cold meant, I am sure, that with spring she bravely undertook the duties of motherhood.

The solid, satiny, black back of a large woodpecker, reflecting scintillant blue-green in the proper light, tells, when seen among our cheery mites, that an Arctic three-toed woodpecker has come to traverse the valley woods. Douglas fir is a favorite feeding tree of this sturdy northerner. When no Arctic three-toe has been seen ranging the bottomland in months, I have suddenly discovered the handsome woodworker busy on some lone fire-killed or dying, borer-infested fir surrounded by dense forest growth. How he located the prize, so far from his usual haunts, I have never made out. Yellow-crowned alpine and Alaska three-toes sometimes desert boreal forests to accompany the frolickers of the foothills.

Suddenly, without warning, a crystal cascade of snow slips from high, overladen boughs above to spill in a freezing torrent upon us. Its cold, descending breath swirls upward again from the ground, a miniature blizzard enveloping us in its powdery blast. Yet if the small fry of the silent forest never mind, why should we? There is only one regret. Who would not wish to don a feather suit of pygmy size, set a black cap jauntily upon his head, and join this carefree crowd who frolic in chill December?

In Quest of the Condor

By ALLAN D. CRUICKSHANK

"WHAT would you like to do on your last day in southern California?" asked Jim Murdock. I had been asking myself this question all afternoon, but Jim answered it with: "I don't think you should leave without seeing the California condor."

"Certainly," I replied, "but what are the chances on just one day's trip?"

Jim thought them good if weather permitted driving into the heart of a mountain wilderness. So next morning we left Glendale and headed north. Finally leaving the highway, we obtained permission from a rancher to enter his property and took a narrow, tortuous dirt trail up through impressive highlands. Small herds of mule deer pranced off as we arrived; wren-tits filled each glen with a chorus of staccato notes. But my enjoyment of these things was hampered by our progress along narrow, rutted trails that clung to the sides of heavily-eroded mountains. I gripped the seat as I watched the wheels of the car roll along less than six inches from the rim of a breath-taking, precipitous drop.

As a matter of fact, I was scared and admitted it. Jim merely smiled, assured me he had been over this very trail many times, and drove on. The beautiful vista of the mountains, the glimpses of the Pacific beyond, I confess, could not be fully appreciated. But when we finally rolled into a grassy arena, left the car, and took to the trail with packs on our backs, I breathed a sigh of relief and really began to enjoy myself. I was buoyed up, too, by the hope of seeing a great bird with a wing-span of more than ten feet—a rare and majestic bird—the California condor.

Suddenly one of the birds appeared, its waxy-looking orange head glistening in the sun; its extensive black and white, uptilted wings ending in a jagged array of primaries; its motion as effortless as that of a glider I had once seen sailing above the Hempstead plains. The giant bird miraculously ascended without any apparent effort. It diminished in size and then drifted off into the haze of the mountains. I had seen the California condor! The trip was a success. But presently two more condors appeared from nowhere and glided past; then two more. I watched these birds, fully aware of their rarity, fully alive to the fact that thousands of bird watchers would love to be in my place at that moment.

As the birds repeatedly drifted by, disappeared and reappeared, I realized they were following some uncharted route created by strong air currents. We checked time after time and found the course of these condors to be remarkably constant. Ever alert to photograph some species new to me, I thought it might be feasible to hike out to one of the projecting ledges over which the condors sailed, to hide in a crevice and try for a picture as the birds glided over. Soon we were hurrying across country to a promising-looking projection. I tried to convince myself that it was foolish to hope for a photograph of this rarity on so short a trip, and with so little planning. With nervous carefulness I checked my aperture and speed a score of times. Jim did likewise.

We selected an immense crevice to hide in and waited. A condor came into view as a mere speck miles away and drifted down towards us. For some inexplicable reason I found myself trying to hold my breath. I rechecked the aperture and speed of my camera. The bird came on, then swung wide over the canyon and (Continued on page 48)

Condor country, where the air currents provide the birds with gliding aid. Above, a soaring condor with its great black and white wings ending in a jagged array of primary feathers.

What does the rabbit track reveal? Which feet made the marks left by the running animal on the snow? It is necessary to picture bunny as he alights in the snow, bent in a ball, after each bound. His front feet strike first and carry his weight, while the strong hind legs are stretched forward on either side, and the feet are put down firmly, side by side, to furnish power for the next jump. In short, the front tracks are made by the hind feet and the rear tracks by the front feet. And the rabbit is running away from you in the picture.

Night-Strolling Rabbits

By C. HUBER WATSON

OF ALL the autographs written by Nature's wild folk on the snows of winter, few, if any, are more familiar than those made by the common rabbit—with apologies to Noah Webster, who thought only of those autographs that are made by human hands. The familiar tracks are seen in most rural and suburban areas, and often in the heart of cities. Each new snowfall soon bears evidence that this friendly favorite has passed that way, held evening frolics, perhaps romped back and forth across your own lawn.

Yet, familiar as are those tracks, it is fairly safe to say that not more than half the people who see the tracks know in which direction the bunny that made them was traveling. And some who guess the direction correctly are not able to answer satisfactorily when questioned as to which pair of footprints in this very irregular quadrangle of marks was made by the rabbit's front feet and which by the hind feet.

All through the long winter months we will see mazes of tracks upon the snow, yet the makers of those tracks may not be seen at all. Why not spy on these night-strollers, I thought one winter. It would be interesting, if possible, to reveal them just as they are in real life to those who never see them. Nor was it necessary to hold long, cold vigils in order to photograph these rabbits. My faithful camera, with its synchronizing flash equipment, would attend to that, I was sure, if I would only "set the stage" and act as general manager.

The rabbit discovers the piece of apple hanging low over his pathway, grabs it and—flash! The first pull closed the switch and made the contact.

This branch of photography is comparatively new, and its results are particularly interesting because when animals "take their own pictures" they appear in quite natural poses. A delicate mercury switch controls the whole system. The electric circuit connects the switch with the camera shutter, the flash bulb and the trip, which may be made after any of several patterns. A very fine adjustment of all parts must be secured in order to have instant response of both shutter and flash at the same split

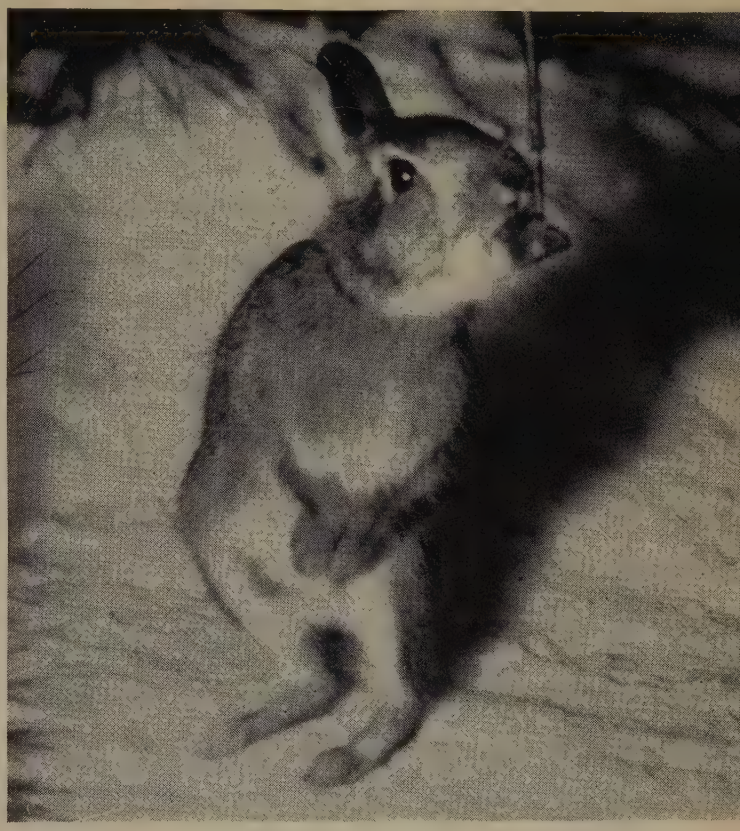
second. With proper adjustments, the picture will be taken at the height of the flash.

Thus it was that I tempted the rabbits to my lawn with apple; lured them into the various positions shown on these pages; and saw to it that there was delicate connection between the apple bait and my synchronizing outfit.

One problem in this branch of photography that must always be reckoned with is the answer to the question: "From which direction will the animal enter the stage?" Because this has to be left to chance to quite a degree rear views and others fully as unsatisfactory are often revealed when the dark room processing has been done.

Occasionally it has been my privilege, from the vantage point of my study window, to see the rabbit at the instant it nibbled the bait, and set off the flash. At such times I have been greatly surprised to see the rabbit's reactions. I had fully expected that any animal so rudely startled would frantically dash away. This was not the case with the rabbits that I observed. Immediately after the blinding flash there has been a slight shrugging of shoulders, perhaps a turning of the ears, as if in an attempt to detect danger. Usually, however, the feast of apple has been resumed after only a short interruption.

After all, an apple is an apple and a tasty item to a foraging bunny.



Possibly recalling the event of the previous evening, the rabbit tries to take the apple away to eat in quiet. Another visitor found the apple a little elusive, after the manner of apples bobbed for in a bucket on Halloween. He followed the bait around until the contact made the picture. In taking these pictures different poses were revealed when the films were developed, but all of them are natural positions.

Typical damage done by the Charleston earthquake of 1886 to buildings on East Bay Street near Chlemas Street, looking south. Salvage work had already begun.

Mr. M'Kinney's strategy to check his opponent's king was interrupted by—

The Charleston Earthquake

By HOBART E. STOCKING

SHORTLY before ten o'clock, on an evening fifty-eight years ago, guests on the upper floors of the Leland Hotel in Chicago had the startling sensation that their beds heaved beneath them. Those who sat upright felt an uneasy sway in the floor. Proof that this was not an hallucination came from the strained creaking of the walls about them. In the corridors puzzled clerks, themselves somewhat uneasy, reassured the guests.

A few seconds earlier in Cleveland, Ohio, a vocalist, on the first breath of song, was amazed to see his audience rise as a unit and scramble toward the exits. In a nearby Negro Odd Fellow's Hall initiation of a candidate halted abruptly as the entire membership rushed downstairs in full regalia, leaving the neophyte powerfully impressed and alone.

A moment before, in Baltimore, the earth heaved slightly. A chimney swung slowly past its center of gravity and fell with a crash into the street.

Along the South Carolina coast that same Tuesday evening, August 31, 1886, there was no sea-breeze to push back the stifling continental air. The day had been bright with sunshine and the mellow brick walls of Charleston retained their mid-day heat as night fell. In the dead calm, full tide in the Ashley and Cooper Rivers mirrored the stars. From the pavilion on James Island came the sound of music as the young folks began their dance. Most of their elders, worn from the oppressive heat, were either in bed or preparing for it.

Mr. M'Kinney sat in his drawing room absorbed in a strategy to check his opponent's king. On the garden terrace a lamp, placed there by his daughter, burned without a flicker. In Tradd Street, Dr. Parker, returning home from a late call, thought the heat singularly oppressive and recalled the tornado that had visited destruction on Charleston the previous year. In front of the Charleston Hotel Mr. Tolson of Baltimore bade an old friend goodnight and turned into the lobby. As he passed through the bright room he spoke to casual acquaintances, requested his room-key and then found his way to a third-floor room. As he lit the gas jet he heard a peculiar noise.

At that instant Mr. M'Kinney looked up from the chess board, his attention caught by a sudden movement of his daughter on the opposite side of the room. Into his consciousness leaped a distant, ominous roar. Dr. Parker on Tradd Street heard the sound

and glanced expectantly at the sky. Mr. Tolson forgot the gas jet; the sound that caught his attention instantly increased in magnitude and came from everywhere.

Five seconds before, at a point sixteen miles west of Charleston and twelve miles below the surface, terrestrial stresses, accumulating for an interminable time, passed the elastic limit of the earth's crust. There was instantaneous rupture, an elastic rebound and from the fracture raced vibrations carrying destruction to Charleston. At three miles a second they leaped the intervening distance to jostle Birmingham; sped beneath the Florida Strait to Cuba; simultaneously raced north to jar Baltimore, New York, Boston; and west to startle Chicago.

Mr. Tolson's room was in darkness and plaster rained from the ceiling. A mighty hand lifted the building and rocked it violently to and fro. The enveloping crescendo of sound mounted to a terrifying roar of falling walls and thundering timbers. How he and other guests managed the passage of three flights of stairs no one ever knew. The lobby was a mess of wreckage and the air thick with plaster dust. The front door was closed and this good fortune favored Mr. Tolson in the moment he fumbled at the barrier. As the door swung open a mass of masonry struck the sidewalk at his feet.

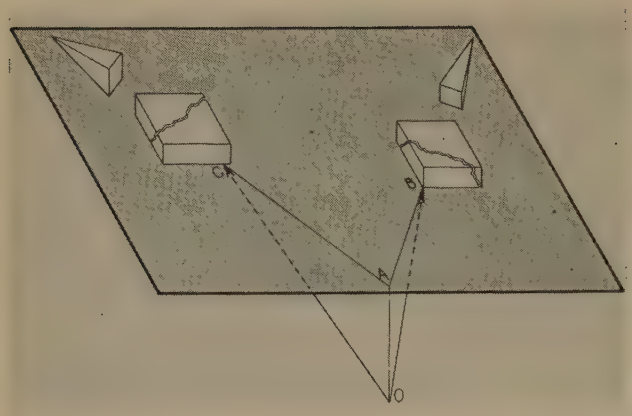
A trough of silence followed the tumultuous wave of destruction. From buildings throughout the city terrified beings fought their way to comparative safety in the streets, some screaming, some in stupefied silence. To ears still ringing with bedlam, human sounds were pitifully weak. Half a block up Market Street a brick wall surmounted by a tall chimney swayed gracefully over the pavement and thundered to rubble. All over the city the silence was punctuated by similar detonations. This was not a horrible nightmare; this, so Charleston thought, was the end of the world.

The very earth beneath their feet had opened in ragged gashes. Mud and water spouted forth. From the muck a heavy sulphurous odor filled the air. To Charlestonians it was not only the smell of sulphur water; it was the very emanation of Hell.

In the streets those least cowed demanded an explanation from the nearest neighbor. What was this? What has happened? Did the War between the States cause this? Is it an earthquake?

It was an earthquake, and a severe one. Not within the knowledge of man had a tremor of such violence jarred any part of the United States. In intensity and magnitude it was more severe than the San Francisco earthquake which was to terrify a generation yet unborn. The initial shock had come and gone with the speed of lightning. The vibrations that brought death and destruction to Charleston leaped in seconds to

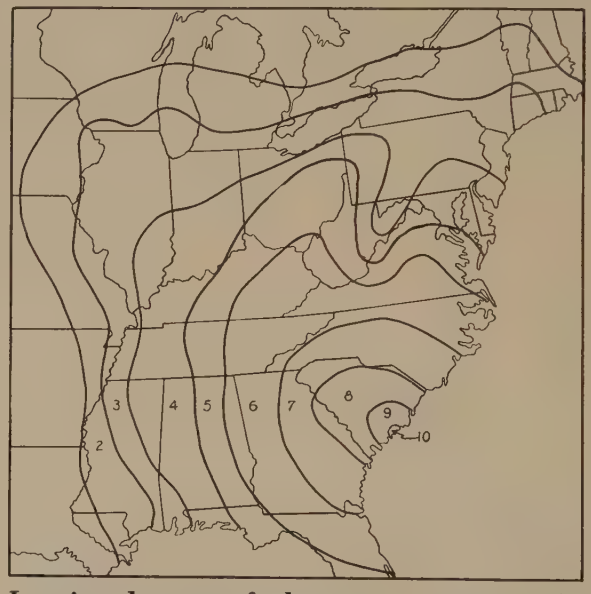
After the tremors had subsided, Charlestonians gather to inspect and discuss the damage done to the portico of the old court house at the southwest corner of Meeting and Broad Streets.



Two monuments (which represent the average of two hundred) miles apart, lie prostrate, thrown by the earthquake. Lines, BA and CA, along the direction of their fall, intersect at A, which is a point on the earth surface directly above the point of origin of the earthquake. CO and BO are lines drawn perpendicular to the face of the cracks in the monument bases and they show the direction of movement of the earthquake vibration. Their intersection, O, is the point of origin of the vibrations. In the Charleston earthquake O was 12 miles below the surface.

move the steeple of the Bedford Avenue Church in New York City through a gentle arc, and sounded the bells in a knell for the dead and destitute in its wake.

Charleston was a victim of its geological setting. The city stands on the Coastal Plain, a belt of rocks of a particular type, which, in a width variable from a few feet to scores of miles, borders North America from New Jersey south into Mexico. These rocks are geologically young and relatively unconsolidated in comparison with the bulk of the strata of North America. They rest on a foundation of much older, rigid, dense strata. At the site of Charleston the young, unconsolidated material is thick and the basement deep. Inland, the soft rocks thin out and the rigid foundation on which they rest can be seen at the surface. The foundation rocks are folded, broken and thrust up to the heights of the mountainous belt of the eastern United States. At Charleston the ancient folded and fractured rocks lie twelve miles deep.



Isoseismal map of the most severe earthquake ever recorded in the United States. The heavy lines mark off zones in which the shock was approximately the same. Intensity in zone 10 was approximately 160 times intensity in zone 7. In zone 4 some chimneys were toppled; vibrations in zone 3 was sufficient to ring church bells in New York City.

Such is the geological setting of Charleston. And when the rigid basement strata moved suddenly along an ancient fracture the resulting vibrations raced through thousands of miles of rock. The overlying unconsolidated sediments of the Coastal Plain took up the movement and magnified it to destructive amplitude. Thus is an earthquake born deep in the earth.

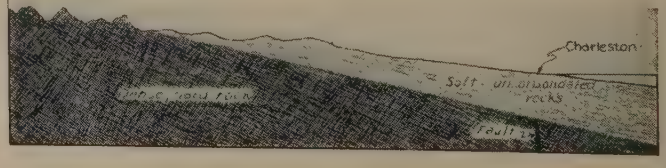
Charleston reeled from the shock. But for a moment the earth was still and the huddled mobs in the streets dared not move. Each individual regarded his escape as a miracle and his position in the street as a haven of refuge from this strange phenomenon.

FIRE! A familiar and dreaded cry rang out, caught up by those who heard and shouted further into the night. In an odd way it was a relief—here was a tangible power, a force that had been controlled in the past. The cry aroused many from stupefied fright. Men moving with a purpose gave assurance to those more bewildered.

At scattered points throughout the city fires kindled from live embers in cookstoves, upset oil lamps and broken gas mains. Where streets were totally blocked, fires raged unhindered; where any movement was possible they were fought with every available means, blessed by an absence of wind.

Stirred into activity, people instinctively gravitated toward more open spaces. Marion Square, Hampstead Mall, Washington Square and Battery Park were jammed. As men, women and children joined the crowds they added their voices to hymns and prayers that rose in ragged chorus. When these supplications died of exhaustion, a minor shock followed by the roar of crumbling walls gave them new life.

Following the first and most severe shock at 9:50



A sketch of the geological setting of the earthquake. The heavy black line marked "fault" marks the inferred location of a fracture. Sudden movement along this break produced vibrations which shattered Charleston.

P.M., four minor shocks jolted the city before midnight, each bringing down its quota of walls weakened by its predecessors. Throughout the night a rumor of imminent subterranean explosion passed from mouth to mouth. At 2 A.M. shocks raced, buildings fell and prayers rose.

The light of Wednesday's dawn brought some small comfort to the harassed multitude, for in a world gone awry they gained reassurance from the break of a new day. The multitude bestirred itself and took stock.

On the north edge of town a Negro family living in a frame house slept soundly throughout the night of terror. There was no limit to their astonishment when they surveyed their surroundings. Mr. M'Kinney found the lamp in his garden upright and burning steadily in the continued calm, surrounded by the debris of his home.

Most of the buildings along Market Street were totally destroyed. Hanes Street was partially leveled, the Hibernian Hall had lost its front, the Courthouse was a wreck and the Charleston Medical College was shattered. By actual count 14,000 chimneys lay in the streets. As far as it was checked the railroad was completely askew; not a telephone or telegraph line remained in commission. It probably did not occur to any inhabitants that the world outside was as worried about Charleston as the city was worried about itself.

The site of Charleston, between the Cooper and Ashley Rivers, was for the most part solid ground. As the city had grown, the numerous small swampy indentations had been filled to the general level of the land. This "made ground" was definitely marked by the greatest destruction. Buildings founded on compact natural earth were shattered, but structures on "made ground" were leveled. Brick structures in which the old-fashioned technique of applying burned oyster-shell mortar to wet bricks had been used were less affected than newer buildings in which a more rapid method had been employed. Frame houses, having some resiliency, suffered least of all.

During the night, hideous with twitchings of a mobile earth, the death toll had been estimated in thousands. Doctors quickly mobilized and temporary hospitals and morgues were set up. Four ships at anchor in the estuary were converted into emergency hospitals, equipped with material salvaged from the Medical College. Efficient small groups explored the ruins block by block, searching for dead and injured.

At 8:30 workers and watchers stopped suddenly as another vibration toppled loose masonry. No one would venture into wrecked houses or shops for food, but many risked their lives to rescue the injured. The final count was remarkably low—29 killed outright, 51 fatally injured.

For the moment Charlestonians paid little heed to property damage, nor was the auditing of this loss yet complete. At 1:30 the city held its breath for the duration of another minor tremor. Where restless earth was concerned familiarity did not breed contempt. Aside from rescue parties few people ventured from the safety of open spaces.

By late afternoon a single telegraph wire was in commission and news of the plight of Charleston sped out to an uneasy world. The city was astonished to find itself the focus of attention and messages came in and out as fast as relays of operators could handle them.

At 5 P.M. the beleaguered populace braced itself for another shock. As daylight faded, families gathered into tired, hungry groups and settled themselves to make the best of bad accommodations. They were not settled long, for at eight o'clock there came the din of wilting masonry in the wake of speeding shock. In the darkness a wave of hysteria swept the crowds, and prayer meetings and hymns burst forth in renewed vigor. As appellants dozed from exhaustion, peace hovered momentarily over the parks. At the corner of Marion Square an alarm clock rang out sharply in the dark of early morning. Instantly every human in the park was awake. Some leaped to their feet to meet or escape an unknown terror. As an apologetic word from the abashed owner passed from mouth to mouth it left a wake of rippling laughter.

On Thursday, hard labor established a degree of order. Dangerous areas were roped off and people returned to their homes to survey the damage. A few stores opened and food was available for the first meal since Tuesday. Reporters from the local *News-Courier* polled storekeepers and found that "business was as good as could be expected under the circumstances. We expect a good fall trade, earthquake or no earthquake." Citizens labored mightily to bring order to their own small corner of chaos, and at nightfall, exhausted from two sleepless nights, Charlestonians prepared to spend the night under what remained of their own roofs.

At 11 P.M. on Thursday 53,000 leaped as one man toward the nearest open area as the eleventh shock raced through the city. It meant another night in the parks, for as each shock leveled its quota of cracked walls it left others (Continued on page 48)

Only Man Knows

By SAMUEL A. HARPER

The lightning did not know that man ordained
A blackout, so it flung unwittingly
Bright beams to earth, and steel and stone
Winked in the dark. The thunder did not know
It simulated with its crash and roar
The welter of discordant war.
And then a single star appeared again
And mutely hung there offering
Its quiet radiance to a gloomy world.
The heavens do not know. On earth below
Only man knows. But does he know too much?

Although the big gray species gets most of the publicity, equally interesting are the—

Wallaroos, Mountain Cousins

By HOMER F. SNOW

Baby takes a peek at the world while mother stretches for a morsel. (Photograph by Ed Fernquest.) At right a wallaroo infant that died and was ejected from the pouch. At about two weeks it was less than two inches long and weighed only 98 grains. (Photograph by the Author.)

KANGAROOS have claimed the spotlight that war times have turned brightly on the wildlife of the Australian continent and the islands of the South Pacific. Yet they are members of a family that includes other interesting members and relatives. Among these are the wallabies—small kangaroos, some no larger than rabbits—and the wallaroos, woolly and more heavily built kangaroo first cousins inhabiting the forested hillsides of both western and eastern Australia.

When Captain James Cook was exploring the Australian coast in 1770, a native brought to the naturalist of the ship's company a strange gray animal. It had a long and powerful tail, long hind legs and short front legs. It was in all ways a strange beast, and the naturalist sought its name. "Kan-ga-roo," said the native. So kangaroo it became in the natural history notes of the voyage. Later it was discovered that the native had replied, "I don't know."

Actually this word does as well as any for a name for the group to which this strange creature belongs. Naturalists have considered as important the abdominal pouch in which the female carries and nourishes her young and have named the order Marsupialia.

At the San Francisco Zoo there is quite a gathering of wallaroos. It was there that I became so well acquainted with the species. In fact, I came to know a wallaroo mother so well that I was able to open her pouch with my hand, and photograph the tiny infant inside.

These wallaroos are docile, well-behaved

creatures, standing about five feet tall, and usually somewhat smaller than their lowland cousins. There is one leader of the group and the males seldom challenge his leadership. Once a year the young arrive, the mother usually giving birth to only one baby at a time. In their native land the young appear in late January or early February, but in the United States the seasons are turned around, so they may appear at any time of the year.

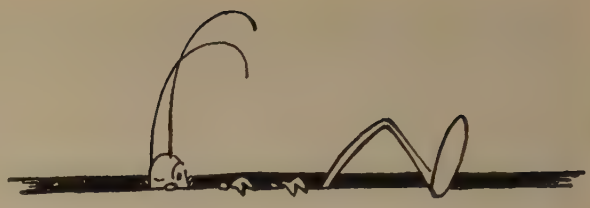
When the mother knows an arrival is imminent, she begins housecleaning. She turns her pouch inside out and cleans it thoroughly, letting it air in the sun for hours at a time. This operation is so peculiar that zoo visitors sometimes report to the keeper that the animal must be injured. With the fur-less part of the pouch exposed, it looks to the layman as though the wallaroo had been cut or torn in the abdomen!

In about six weeks time, as near as we can judge, gestation is complete, and some morning there is a little bundle in the pouch. There is some controversy in naturalist circles as to just how and when the birth of a kangaroo, or a wallaroo, takes place.

It took me more than a year of constant association, using all the technique and tricks known to animal (Continued on page 50)

The youngster has two feet on the ground at last, but will pop back into the pouch on the slightest unusual sound. (Photograph by the Author.) The infant in the pouch below is about three months old, weighs about five pounds and makes a full pouch. (Photograph by Ed Fernquest.)

"Their excessively flat bodies are perfectly adapted for drawing into narrow cracks and hideaways."



On the strength of his lineage and durability we can draw up—

A Brief for the Cockroach

Illustrated by Lawrence D. Conway

By LEONA TRAIN RIENOW

WHEN Bobbie Burns toasted "the louse on a lady's hat in church" in undying verse, he was bestowing undeserved fame. Had he, however, turned his immortal tributes to the cockroach, his praises would have been truly won. For of the fifty or more parasites that have been shrewd enough to fasten themselves upon man, the kitchen cockroach is the aristocrat; the most ancient in family tree; the most perfectly formed and adaptable of them all.

Kilmer puts stirring words into the mouth of an earthworm. Poe elevates the beetle to everlasting eminence. Authors without number write romantic stories of the bee, eulogize the ant, go into ecstasies over the transformation of caterpillar into butterfly. Yet the cockroach, whose spectacular history puts them all to shame, languishes in obscurity behind the kitchen water pipes, with no one at all to put a rhyme to his name.

The Germans call him "The Russian Bug." The Russians, who believe in giving all they take, retaliate by naming him "The German or Prussian Bug." Everyone denies the little fellow, yet this insect of "flattened form and nocturnal habits" has increased until his species alone number 1200, and he covers the earth. The "Oriental Cockroach" —that long black fellow who drops expertly into a crack just as you aim the spray gun at him, has an American genealogy longer than the descendants of the Pilgrim fathers, having migrated to this country in the sixteenth century. The "Croton Bug" — so named from the swarms of this cockroach around the Croton Reservoir — migrated here after the Crimean war. The third common variety, the tropical "American" cockroach, is the mariner of the family, taking over the sea while his brothers take over the land.

"He might even, when desperate, venture a nibble at your fingernails."

Still it is not the cockroach's multitudinous presence all over the globe that is most astounding. It is the fact that this remarkable fellow that we glimpse scuttling behind the pans when we snap on the light is essentially the same primitive creature, in physical make-up and structure, that scuttled beneath the fern fronds away back in the Pennsylvanian coal period some 216,000,000 years ago, before the first bird flashed its plumes across the swamp, before a single flower had bloomed in this old world. Some scientists declare the cockroach is the oldest discovered form of air-breathing animal.

"He is willing to consume anything from whitewash to boots, book-bindings, hair and shoe-blacking."

However that may be, while a primeval dragonfly was still experimenting with showy wings measuring twenty-nine inches across, and a primitive spider was admiring the increasing girth of his little round belly (both of which experiments failed ruinously) the smart father cockroach, with his generalized, practical structure, was already well launched on an ambitious career of world dominion.

This Adam Cockroach did not want anything fancy, like a twenty-nine-inch wing span. He absolutely did not believe in self-indulgently permitting one's abdomen to become so stout that he could not get around quickly. Just so the comparison would not be too humiliating, he let himself grow to a maximum length of perhaps four inches—nothing radical, you understand—but otherwise than that he favored a simple, fast, adaptable structure, something with staying qualities.

So while giant fern trees sprang up and withered over night above him, and the slippery, clumsy bodies of Permian amphibians slithered in the primeval slime, the cockroach multiplied until he *outnumbered every type of animal on the earth;* until the coal measures are known today as the "Age of Cockroaches."

"They are the accomplished acrobats of the regions of pipes."

One effective example of his adaptability to environment illustrates this insect's most valuable quality: in that ancient fern age he was able to change the physical contour of his wing to resemble so closely the small fronds of a fern that scientists today must puzzle considerably over fossil remains to distinguish between the two!

Besides his excellent choice of make-up and his adaptability, the cockroach developed longevity, so that today he does not mature until he is more than a year old. Heaven knows how long he lives after that! He beat man to the gun with an emphasis on year-around mating and reproducing, leaving seasonal rutting to the less energetic and less ambitious animals. Like man, but also preceding him, he keeps his infants snug and safe in a cradle of his making, while they develop strength to face the world.

Moreover, cockroaches do not battle among each other. They respect each other's rights—another reason for their persistence in a world of tooth and fang rule. Although their appetite for bed-bugs is enormous, and they wage a relentless, cannibalistic war on these smaller animals, when one species takes over an apartment house as its own, the other usually waves good luck and passes on to the next one.

". . . the cockroach might even consider growing a new leg, if one of his six is missing."

Still another reason for the cockroach's successful survival throughout 300,000,000 years (a record hardly equaled) is his unfinicky appetite. He is willing to consume anything from whitewash to boots, book-bindings, hair, and shoe blacking. His taste runs the gamut of all the foods known to man, on down through such delicacies as ink, leather, the pith of living cycads and cured skins. He might even, when desperate, venture a nibble at your eyelashes or fingernails while you are sleeping! Though these little *bêtes noires* can live 76 days without a speck of food, there should really be no reason for their having to. But one article of diet disagrees horribly with them (and certain of us humans will find a twinge of sympathy at this mention)—cucumbers!

But their versatile taste is only one factor in their superior make-up. Their excessively flat bodies are perfectly adapted for drawing into narrow cracks and hide-aways. They are the accomplished acrobats of the regions of pipes. Their 1800 facet compound eyes are as fitted for the dusky crannies of modern apartment kitchens as they were for the dark interiors of the caves of our ancestors, to whom they were no doubt especially attentive, it being in the era preceding the discovery of sodium fluoride.

How many land creatures can survive twenty minutes under water? How many creatures can grow new noses, once their old ones are lopped off? In fact, the cockroach might even consider growing a new leg, if one of his six is missing. He is not so stupid as his cousin, the cricket, who advertises his presence on the hearth, to his extinction. Nor does he take time off to hibernate, like the furniture beetle,

who chooses its residence in the parlor suite.

Of course, he has his own troubles. A Ph. D. dissertation recently treated "The Parasites on the Cockroach." He continually struggles against a long list of natural enemies such as the frog, wasp, monkey, hedgehog, cat, rat, bird and lizard. And man has found uses for him, to add to his worries. The cockroach furnishes excellent laboratory material for dissection, because of his size and beautifully generalized structure.

In Russia the "Prussian Cockroach" cures dropsy, they say. Our own city of Philadelphia has been known to deal furtively in cockroach tea and pills. Salted cockroaches are claimed to have an agreeable flavor that may be discovered in popular sauces. So when some wit in a restaurant asks you to hand over the "bug juice" it may be that he is not far wrong.

Such is the history of these most ancient of living creatures—they who looked with scornful eyes upon the giant dinosaurs of pre-history, who fled before the heavy tread of the cave man, coming with his torch to inspect his storehouse, who sailed the seas with Sir Frances Drake and his spices, and who today lurk shyly behind your cupboard shelves. Serve them their insect powder respectfully, and doubt not that they will keep on multiplying anyway. That is their nature.

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Strange Element

By DANIEL SMYTHE

Air is the element pressing trees and stalks
In endless whirls between the sun and earth.
It strikes in waves the ribs of northern rocks,
Cavorting through the space that gave it birth.

It is an ageless force, huge as the sea,
Either in pines that roar, or swift on plains
Where nothing heeds it; dust or snow may be
The charging horses stung beneath its reins.

Wind like a blade slides the beleaguered miles
Across the Arctic ice . . . or it may fling
With sun-hot whips lashed on the desert's piles,
And it may turn a storm or lift a wing.

With hope to some it blows the mist away—
A cooling presence, flowers upon its lips.
It is the salt wave racing into day,
Or dawn that gleams the wings of fishing ships.

Air is our breath—air over earth and stones,
Fitted to mountains, on things from sky to ground.
It lies in bark and feathers, lungs and bones,
And for our praise, it gives us words and sound.

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Rastus, 1919-1943

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Known to thousands of visitors to Grand Canyon National Park, Rastus was the companion of many who rode the steep trails into the Canyon. For safety, children were placed on his back for the trip, or he carried heavy loads. In his younger days he had speed and was so well broken to the saddle that he was used instead of horses in rounding up wild horses on the South Rim. As age crept up on him he became a bit rheumatic and incapable of heavy work, so he was taken to good pasture on the North Rim and worked only now and then for a trip to Cottonwood. Just when he died is not surely known for he was found by an Indian mail carrier, all four feet caught in a snow-covered cattle-guard at Big Jim Tank. In reporting his passing, Harold C. Bryant, Superintendent of the Park, writes: "Mule Heaven cannot be too good a resting place for so faithful and dependable a servant of man!"

Naturally a convivial fellow, Charlie joins the group around the campfire, the object, besides friendliness, being as usual the hope of mooching a morsel or two of whatever may be handy. Charley makes no claim to being a Boyer but seems to be able to put undeniable finesse into being kissed by a lady, Margaret King of Topeka, Kansas, who is a visitor to the Howe ranch.

Charley

Photographs from Acme

Around one hundred wild deer roam the expansive acres of Gene Howe's ranch at Canadian, Texas. One of this band, however, is a distinct individual, a white-tailed deer known affectionately to many as Charley. When he wearies of his wild companions and the wide open spaces, he heads for the ranch house, leaps the fence into the front yard, and walks confidently and unannounced into the big house.

Always welcome, Charley seems to be equally at home in any room in the house. However, he has his favorite rooms—the dining room and the pantry—where he knows that he is reasonably certain of special delectable handouts that just do not seem to exist out on the range. After he has stocked up with enough human food, he seems to weary of his two-legged friends and lopes off to the hinterland of the ranch again. Charley's exact age is not surely known, but, from certain indications, he is believed to be four.

Finding interesting things going on in the dining room, Charley joins ranchman Gene Howe (left) and guest, Victor King, at the table. Endowed by nature with a neck that is admirably adapted for the "boarding house reach", the deer helps himself to a slice of bread.

Coming in off the range to the ranch house of the Big Bull Ranch, Charlie gracefully clears a five-foot fence on his way to lunch. As a variation from the free life on the range and the occasional visits with his human friends, Charley goes fishing with Mr. Howe. Swimming alongside the boat, the deer scares all the fish away, which ruins Gene Howe's day. It is all the same to Charley, however, because he does not eat fish anyway.

High in the Rockies

MARY PEERY WHITTAKER

His eyes beheld far-flung immensity
  Where lofty grandeur spoke in muted rhyme,
Like moonlight's lyric hush upon the sea.
  Above him loomed colossal peaks of time—
Dim now with aureole of cloud and mist,
  Creation's monuments in mammoth stone,
Where dreaming ages keep a phantom tryst
  With magnitude and silence there alone;
But he had glimpsed more than the high white lure—
  The hour had lent him peace and lulling calm.
All turbulence had fled . . . Strength to endure
  Flowed free—a gift like healing balm.
A weary man where cosmic bounty spills,
Had lifted up his eyes "unto the hills."

When the mouse that had been placed as reserve food supply was disturbed, the better to position it for photographing, the little saw-whet pounced to retrieve it, looking with its bright eyes in what seemed to be reproof.

A Winter Visitor

By DR. RUSSELL T. CONGDON

When winter snows blanket the higher mountain meadows, the saw-whet owl drops down to the Columbia River valley. Late December finds him well established in the dense willow thickets along the great river's margin. Here the snow does not lie too deep and an occasional patch of earth, uncovered by the warming sun, permits the field mice to emerge from their burrows. Under these favorable conditions the saw-whet's larder is kept well supplied. Not infrequently we have found this diminutive owl perched in his daytime retreat with one or two dead mice suspended in the forks of a branch close at hand.

The saw-whet shown in the picture had chosen a protected perch in a fir tree, to which he returned day after day. One day we discovered that he had placed a fat mouse in cold storage on the bough near his feet. We just had to have a picture of that! Reaching with a slender stick we made an attempt to place the mouse where it would better show in the picture. At the first movement of the mouse, the saw-whet pounced with claw and beak, as if fearful that its prey might escape.

Not easily alarmed, the saw-whet owl is readily approached, and occasionally, by moving cautiously, one can reach out and grasp the unsuspecting little fellow. What a soft little handful he seems to be, but what needle-sharp little claws!

A flicker's nest cavity in a dead poplar was the daytime retreat of one of these amusing little owls. On several weekly visits his "little old man's" head was seen filling the door, as he turned to watch his visitors, or dozed in the sun. We hoped that he would remain and raise a family here, but early in March he departed with the snow and the red-shafted flicker was back at his home.

The saw-whet owl, *Cryptoglaux acadica*, ranges over most of North America. Its call is sometimes harsh, and like a saw being filed, but at other times

The saw-whet owl peers from a flicker's nest hole, which it took over temporarily, but deserted in time for the red-shafted owner to return and rear a family. The little saw-whet is just a handful. In fact, it is really about the size of a towhee, although its long, broad wings and its coat of loose and downy feathers, which permit it to endure severe winter cold, make it look larger. There is no better mouse trap than the saw-whet. In winter it feeds chiefly on mice and in summer it adds insects to its diet. Although a bird of prey, this little bird is distinctly beneficial to man.

●

is softly intoned, with a ventriloquial quality that makes it seem faint and far away. It hunts silently at night, living mainly on mice, with insects varying its diet in summer. It is definitely a beneficial bird of prey.

ACT I—Fifi has a midnight snack by munching away upon the brains of Alfy.

The Survival of the Fittest

A Tragedy in Three Acts

by JOHN W. BAECHLE

Setting for all three acts: St. Joseph's College Biology Laboratory.

Act I—Eleven P. M., One Evening
Act II—Eleven A.M., Next Morning
Act III—Early the Following Morning

CAST OF CHARACTERS

FREDDIE, "The Bully," a five-foot bull snake
ALFY, a cousin of FREDDIE'S, a sixteen-inch bull snake
FIFI, a hungry deer mouse
HELOISE, a distant cousin of FIFI'S, a common house mouse.

PROLOGUE

Although for the past several months neither Freddie nor Alfy had eaten a bite of food, they lived contentedly together in the glass cage that was their home after they came to St. Joseph's College. Then one day Fifi, who lived in a small pine grove near the laboratory, wandered a bit too far in search of food and found herself caught in a trap intended to catch birds alive for banding—a deer mouse in a bird trap! But a deer mouse in a cage with two hungry bull snakes was more appropriate. So it was not long until Fifi found herself, a bit bewildered but not afraid, running circles in the snake cage. Frequently she bumped her nose upon the glass wall. Often she scampered right over little Alfy, and once she even burrowed in the sand right under Freddie's coiled up body. Neither of the snakes seemed the least bit grateful for this potential feast, and so nothing happened until late that evening. At this point the curtain rises upon—

ACT I

Neither Freddie nor Alfy seemed very hungry, but for several long hours Fifi had been feeling the pangs of hunger. She may have mused to herself, as a thoughtful mouse might do, "If mice are good food for snakes, why shouldn't snakes be good food for mice?" (Fifi had never studied Logic.) Then the unbelievable happened. To check her theory, Fifi decided to have a midnight snack of bull snake. Alfy's small size made him appear more tender and tasty than tough old Freddie, so Alfy was selected for the menu. After some bullying around Fifi gained the upper hand and killed Alfy in a quick and easy way by consuming his brains as an entree. These tasted very good, and in a surprisingly short time Fifi had her fill of snake lunch. The crumbs that fell consisted of only the skin and some sections of poor Alfy's vertebrae. During the battle and victory feast Freddie lay unconcernedly in the opposite corner,

probably figuring that the more that Fifi ate—even if it was his cousin Alfy—the bigger and fatter she would be when he got hungry. Then Fifi lowered her head, and placing it between her legs she fell asleep.

ACT II

Next morning found Fifi scampering around in the cage and even stealing free rides on Freddie's back as he meandered about in the cage. But soon a new visitor arrived. It was Fifi's second cousin, Heloise, a common house mouse. Fifi seemed glad to see Heloise, but when Heloise met Freddie she jumped right out of the cage and dashed for the nearest corner of the Laboratory. It was not until Heloise had been mercifully clubbed to death that she could be induced to reenter the cage. By this time Fifi was again getting hungry, for it was almost dinner time. As the last morsel of what had been Heloise slipped down Fifi's greedy gullet, Freddie's eyes were gleaming with satisfaction because more weight was being added to Fifi's already plump figure. After Fifi had turned Heloise inside out and cleaned the left-over bones well, she again went to sleep.

ACT III

Some time during the following night or early morning Freddie and Fifi must have had a tussle. Who started it is not known. Perhaps Fifi was again in search of a midnight luncheon and decided to pick on Freddie, or perhaps Freddie decided to have some breakfast for a change.

ACT II—Freddie, the Bully, permits Fifi to fatten herself on the cadaver of Heloise, the house mouse

ACT III—Freddie, the Bully, whets his appetite between the strangled body of Fifi and the remains of Heloise.

At any rate, the following morning found Fifi, partly encircled by Freddie's strong muscles, lying motionless a few inches away from the remains of Heloise. The post mortem verdict was unanimous. Death by acute and prolonged strangulation was the cause of Fifi's untimely death. The remains of the actors in this drama are interned in glass at the Biology Laboratories of St. Joseph's College, Collegeville, Ind.

This splendid photograph of a Gila woodpecker at its nest in a cottonwood stump was taken in the Colorado Desert, by Dr. Richard L. Caswell of Los Angeles. Noisy and active birds, these woodpeckers sometimes adapt themselves to human association, and may be heard by the rancher hammering on dead tree stubs, uttering their high-pitched squeals, or excited trills—when welcoming a mate—or sounding a low, harsh *churr, churr*. The back, narrowly barred with white, and the two whitish patches seen as it opens its wings in undulating flight, are distinguishing marks.

As We See It

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WAR and WATERFOWL

This is the title of a report signed by Albert Hochbaum, who lives on the edge of "one of the finest waterfowl breeding marshes in the land," evidently near Delta, in southern Manitoba. His report is sponsored by the Wildlife Conservation Committee of the Wilson Ornithological Club, Frederick N. Hamerstrom, Jr., Chairman, and appeared in the September issue of the *Wilson Bulletin,* pp. 212-214. We consider it important, since it provides an answer, in part, to a series of news items and other releases that have been circulated during the past year by the Federal Government, and the game commissions of several states, encouraging the "harvesting" of real or supposed "surpluses" of game to supplement reduced meat supplies. To this end, the release of more ammunition was urged as imperative. Mr. Hochbaum thus summarizes "some of the arguments . . . given to justify an open season and the use of shells:

"1. Duck meat can replace domestic meat in the present meat shortage.

"2. Unless we 'harvest the crop' there will be an over-population of waterfowl which will: (a) exhaust the natural food supply and ruin the range, as overpopulations of deer and cattle do; (b) become a serious threat to cultivated crops; (c) provide an opportunity for the illegal 'market hunter' to reestablish himself.

"3. Duck hunting would provide a necessary relief for war-torn nerves."

The author agrees that some forms of game should find a place in our war economy, but denies that ducks should be placed on a plane with deer on an overpopulated range. As to cost of such meat he refutes the statement of a sporting editor that duck meat may be taken at an average cost of about eight cents a pound (the cost of shells) by showing that, counting ammunition only, the cost of duck meat is about twice this figure, and counting other expenses, its cost is about a dollar a pound.

Mr. Hochbaum states that there has been some "build-up in waterfowl numbers during these last few years, but that this is only an increase over the lowest figure in North American waterfowl history," and that the species are mainly mallards and pintails (both with wide breeding ranges), but that, while the canvasback, red-head, lesser scaup and ruddy duck have been saved from extinction, "their numbers are still distressingly small and their future uncertain." Yet we note in the current regulations (published since he wrote his report) that these species, excepting the redhead, are given no special protection —that is, the daily bag-limit of ten birds may be all canvasbacks, lesser scaups, or ruddy ducks.

"Mallards, pintails, black ducks and other species in some localities will feed upon cultivated crops this autumn and winter," Mr. Hochbaum reports. "Even during the years of the 'duck depression,' damage to grain fields in some localities was a problem. Such farm feeding is not evidence of depleted natural food supplies. In this region mallards and pintails annually feed on stubble fields, despite the fact that their loafing water provides a plentiful stand of wild duck food. Now, as in the past, this is purely a local problem; it will not be relieved by placing control in the hands of gunners. Crop damage is most serious in a delayed harvest. This year the harvest in some regions will be delayed because of shortage of manpower. If duck hunters truly have the welfare of ducks and crops in mind, they will give their spare time to help with the harvest in regions where there is a combination of man shortage and farm-feeding waterfowl.

"We have confidence in those who plan [the regulations] . . . yet if we as ornithologists fail to put forward sound, democratic opposition to the sportsman pressure groups, we are no less responsible for imprudent changes in policy than the groups which forced them through. It is our responsibility, individually and collectively, to keep informed on the waterfowl situation just as we keep up-to-date on developments in nomenclature or life history study. And it is our obligation through the remaining years of the war and after the war to take an active part in the planning and maintaining of sound waterfowl policy."

As is usual in cases involving relaxed shooting rules, the eagerness of those interested in more hunting results in much publicity not warranted by the facts. In many cases the supposed danger of overprotection is emphasized and the obligation to safeguard the species is minimized or ignored. We are glad, therefore, that Mr. Hochbaum, himself a hunter, has exposed some of the fallacious reasoning. Every American duck hunter should read his report.

A Gathering of Plurals

By M. F. ASHLEY MONTAGU

COLLECTIVE or group words are not unfamiliar in the every-day speech of most of us. Many of these words have been taken over from the language of natural history and the field. In terms of imaginative meanings these words are among the richest in our language, and among the most colorful; yet they are actually among the least frequently used of all the words in our vocabulary. A large number of these words are not in use at all, greatly to the disadvantage of our speech. It is in the hope that their native attractiveness may so appeal to the reader that he will incorporate them into his own vocabulary, that this gathering or "contesseration" of words, signifying the gathering together of numbers of individuals belonging to the same kind or species, is offered here.

Many of these words are taken from the XVth Century *Boke of St. Albans*, accredited to Dame Juliana Berners, Prioress of Sopwell Nunnery in Hertfordshire. Some of the words she uses were undoubtedly in circulation in the same collective sense before her own day, but most of them were either used in their new form, or coined by her, for the first time. Not only did this gifted lady possess a most poetical imagination, as witness such happy descriptions as a "charm of goldfinches," a "melody of harpers," a "duet of turtledoves," or an "exalting of larks," but she was also the possessor of a sly wit which is well exhibited in her "superior" reference to the humbler orders as a "superfluity of nuns," an "abominable sight of monks," and a "skulk of friars," the friars, significantly enough, sharing the honor of this description with the foxes.

Another rich source of such words is Joseph Strutt's *The Sports and Pastimes of the People of England* (London, 1801), while the best of all is Helen and Philip Gosse's *Gathered Together* (London, 1927). To all of these works I am indebted for most of the group words listed below.

A Apes, a shrewdness. Asses, a pace.

B Badgers, a cete. Bears, a sleuth. Bees, a cluster; a swarm. Birds, an aviary; a dissimulation; a flight; a flock. Bitterns, a sege. Boars, a singular; a sounder of wild. Bucks, a brace (two); an herd; a leash (three).

C Cats, a clowder; a kindle (young). Cattle, a mob; a herd. Chickens, a peep. Choughs, a chattering. Conies, a bury. Coots, a covert. Colts, a rake; a rag. Cranes, a herd. Curlews, a herd.

D Daffodils, a host. Deer, a herd. Doves, a duet; a flight; a brace (two). Ducks, a waddling.

E Eggs, a brood; a clutch; a sitting.

F Ferrets, a busyness. Fishes, a catch; a cran; a flock; a draught; a shoal. Fishers (fishermen), a drift. Flowers, an anthology. Foresters, a stalk. Foxes, a skulk.

G Game, a bag. Geese, a flock; a gaggle. Geldings, a brace (two). Gnats, a cloud. Goats, a flock; a tribe; a trippe. Goldfinches, a charm. Goshawks, a flight. Grapes, a bunch; a cluster. Greyhounds, a brace (two); a leash (three). Greys (company or assembly of badgers), a cete.

H Hares, a brace (two); a down; a huske; a leash (three). Harriers, a couple. Hawks, a cast (two); a leash (three). Hens, a brood. Herons, a sege. Horses, a harrase; a team. Hounds, a couple; a mute; a pack. Hunters, a blast.

K Kine, a drove. Kittens, a kindle.

L Lapwings, a bevy. Larks, a bevy; an exalting. Leopards, a leap. Lions, a pride. Locusts, a cloud; a plague.

M Magpies, a tittering. Mallards, a sord; a sute. Mares, a stud. Martens, a richness. Mice, a nest. Moles, a labor. Mules, a barren; a rake.

N Nightingales, an ode; a watch.

O Oxen, a drove; a team; a yoke.

P Partridges, a covey; a brace (two). Peacocks, a muster; a pride. Perch, a pack. Pheasants, a brace (two); a bouquet; a nye. Plovers, a congregation; a leash. Porpoises, a school. Puppies, a litter.

Q Quails, a bevy.

Rabbits, a nest. Racehorses, a string. Ravens, an unkindness. Roes, a bevy. Rooks, a clamor; a building.

Sheep, a drove; a flock; a hurtle. Sheldrakes, a dropping. Snipe, a leash (three); a walk; a whisp. Snowflakes, a flurry. Spaniels, a couple. Sparrow, a host. Starlings, a murmuration. Swans, a herd. Swine, a drift.

Teals, a spring. Toads, a knot. Trees, a clump; a grove; a parcel. Trotters (pigs), a nest. Turtles, a duet; a dule.

Whales, a school. Whelps, a litter. Wolves, a rout. Woodcocks, a fall. Wrens, a herd. Wood, a pile.

Zebras, a daubing; a stripe (two).

★

Llama, "Peruvian Sheep"

By EDITH M. LAING

Life for the early Peruvians, only native Americans to domesticate animals, revolved to a great extent around the llama. Upon it they depended for meat, milk, warm clothing and transport. No wonder that its likeness appears on the country's coat of arms and postage stamps.

Its adaptation to arid and lofty regions; its remarkable endurance on a diet of tough and scanty herbage; its broad, wool padded back, and its spongy foot-pads, each equipped with a special non-skid talon, make the llama ideally suited for Andean pack service.

The llama is one of four species of animals called by the Spaniards Peruvian sheep, although they really belong to the camel family. The llama and the alpaca are domesticated, while the vicuna and the guanaco remain wild.

As part of the super-regimented life under Inca rule, everything pertaining to the llama was governed by the strictest regulations concerning the pasturing and breeding, and the shearing, storing, distribution, spinning, and weaving of the wool. Inspectors assiduously checked up every home to see that the spinning and weaving were properly done. This system was ruthlessly destroyed by the Spaniards, who killed countless llamas just for their brains. As a result many a wretched Indian starved or perished from cold.

Prescott states that the immense flocks of llamas were the exclusive property of the Incas. Every year large numbers of the males were killed for the royal tables, or for religious rites. At certain festivals the humble folk were permitted a taste of the flesh. After the priests had examined the interior of a sacrificed beast for portents of the future, and the offering had been burnt, the flesh of other animals was distributed to the peasants, who consumed it during a feast.

To ensure good crops, numbers of brown llamas were sacrificed, after which a white one adorned with golden ornaments was led through the freshly ploughed fields.

A llama pack train is picturesque, the animals leisurely picking their way along the trail, heads held high, with crimson ribbons in their ears, and bells about their necks—the Indian driver often industriously knitting as he strolls behind. History records that, when the Spaniards came, 300,000 animals formed the transport train to and from the rich Potosi mines. Today, air transport and Peru's recent program of road building are fast dooming the pack llama. Besides, high country Indians are gradually drifting down to the warmer coastal regions where wool is not so necessary.

Noting the llama's habitual air of disdain, it is not surprising to learn that should a pack animal be loaded with more than 100 pounds, it will lie down and refuse to budge. Nor can the elegant creature be hurried on the trail. It tolerates its Indian attendant of necessity, but a stranger presuming to approach "the presence" is likely to find himself halted by a well aimed spray of highly offensive saliva.

In the zoo some llamas are black, some tan, some cream, and some a combination with neck and face patches. Nature has provided them with ready made pads on their front knees for easy kneeling when they lower themselves to rest.

In a spacious enclosure labeled *Llama glama glama*, these haughty aristocrats stalk about wiggling their narrow pointed ears, drowse in the sun, and feast upon chopped alfalfa, grain and molasses. Their bored and scornful demeanor towards an inquisitive public does not invite a cosy get-together. One instinctively averts one's eyes and discreetly passes on to the next exhibit.

Supply of essentials for effective insecticides complicates the strategy of war on—

The Insect Battle-Front

By ANDREW S. WING

WHEN the history of the war is finally written, an interesting chapter will be the part that insect poisons have played in the defeat of the Axis. For insecticides are critical materials, not merely in the Victory Garden, but also in the battle against malaria-carrying mosquitoes and other noxious pests on the many fighting fronts.

One of the many prizes that the Japs acquired when they took over the rich islands of the South Pacific was derris root. Derris root is a carrier of rotenone, a potent insect poison, and before the war about sixty percent of our supply came from that area. Of 6,500,000 pounds of rotenone-bearing roots and powder imported into the United States in 1940, more than half came from the Far East. Other sources of this product had to be found. Our neighbors in South America, where rotenone-carrying plants also grow, are cooperating to the fullest extent, but the situation is tight, to say the least. Meanwhile the limelight is cast on a little known but interesting phase of our eternal battle against the insect world.

To be sure, there is another insect poison that is both effective and safe to use. It is pyrethrum, the toxic principle of a pretty, daisy-like flower. But pyrethrum is another war casualty, although for another reason. Pyrethrum has literally gone to the front, not to spray on Japs and Germans, but to use on mosquitoes, flies and other insect pests. Before World War I, pyrethrum came from the mountains of Dalmatia. When that source was cut off, the Japs made a profitable thing of it for a time, although the quality of their product was poor. Now the principal source of supply is Kenya, a British colony in East Africa. The American company that made famous the slogan "Quick, Henry, the Flit" tried to interest farmers in Pennsylvania and other states in the culture of pyrethrum. Experiments showed that a high pyrethrin content could be obtained here, and the yield was satisfactory, but the price obtained per acre was not sufficiently alluring to induce American farmers to grow it. I visited a pyrethrum farm in the mountains of Pennsylvania some years ago. It was a pretty sight; but until the price rises, or the cost of harvesting the flower heads is reduced by mechanical means, we will probably continue to rely on the cheaper labor of foreign lands for this valuable bug baiter.

Pyrethrum has an instantaneous effect on the insect it touches, either in powder form or as a spray. It paralyzes, but the insect may recover; hence a mixture of rotenone and pyrethrum is sometimes used. Rotenone acts more slowly but it is surer to kill. Rotenone seems to have the power to penetrate the insect; except, of course, such horny-sided creatures as the Japanese beetle. These oriental pests need an actual stomach poison, apparently, to knock them out.

Rotenone came into general use by natives of the East Indies, South America and Africa long before the white man penetrated these jungle countries. In Africa, Zulus used it to kill head lice, and the Peruvian Indians used it to free their llamas, principal beast of burden, from ticks. Rotenone for vegetable use was first reported from British Malaya, although it is likely that the Chinese, wise farmers for forty centuries, had used it even before that.

The most picturesque use of derris root, cubé and the other rotenone carriers is as a fish poison. Pagan tribes of Borneo and jungle Indians of South America have long made a practice of poisoning fish. One

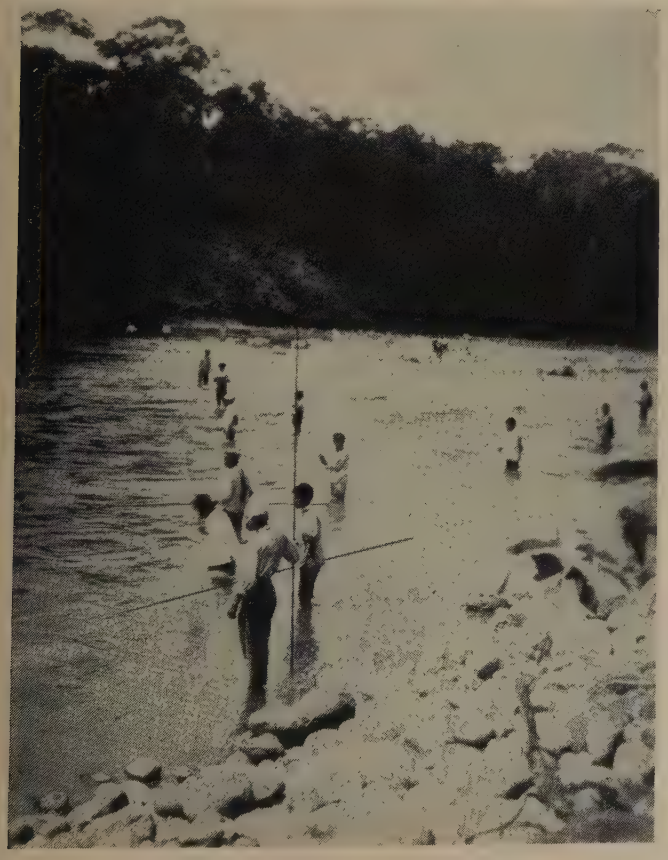
A plantation in Peru of lance-fruit, *Lonchocarpus utilis*, now an important source of rotenone, most effective essential for a truly killing insecticide.

method was to dam up a stream, then dump boatloads of a solution of bruised derris root into the water. As the fish absorbed the poison they rose to the surface stupefied, rushing wildly around in circles. They thus became easy prey for the natives, who either speared them or caught them in nets carried by women. Great quantities of fish were easily caught in this way, and those not needed for immediate fish fries were dried and stored for future use. No effect on the natives results from the rotenone absorbed by the fish.

Entomologists have tested rotenone on some 800 kinds of insects. It is effective on relatively few species, but those to which rotenone is lethal form a pestiferous and dangerous lot. They include the Mexican bean beetle, pea aphid, pea weevil, cabbage worms, fleas, flies, lice and ox warbles. Rotenone is fifteen times as deadly as nicotine on the bean aphid, but it is devoured by the southern army worm with no harmful effects. Derris roots in storage are actually devoured by certain insects, but it is deadly to enough of them to make it of great economic importance. And to man and other warm-blooded animals it is quite harmless.

Since the war, the cultivation and collection of rotenone-bearing plants has been greatly speeded up in this hemisphere, mostly in tropical South America, although Puerto Rico and Central America are also sources. Through plant breeding the rotenone content of derris root has been increased to an average of from five to seven percent. These improved varieties yield from 800 to 1700 pounds of roots per acre in Puerto Rico. That is much higher than the average of collected roots, which runs quite low. An even better bet than derris seems to be lance-fruit, *Lonchocarpus utilis* and *L. urucu*, which yield as high as 16.7 percent rotenone. These are the plants that were used by Amazon Valley Indians as fish poisons. The plants are propagated by budding.

Ecuadorean natives lined up to spear stupefied fish as they float downstream after infusing the pounded stems of *Lonchocarpus* into the water.



In order to stretch our dwindling rotenone supply as far as possible so as to cover the commercial crop, as well as 20,000,000 Victory Gardens, the percentage in the prepared insecticides was cut this season to .50 percent. That is not very strong, although if properly applied and at the right time it may be effective. The content will probably be increased to .75 percent for 1944.

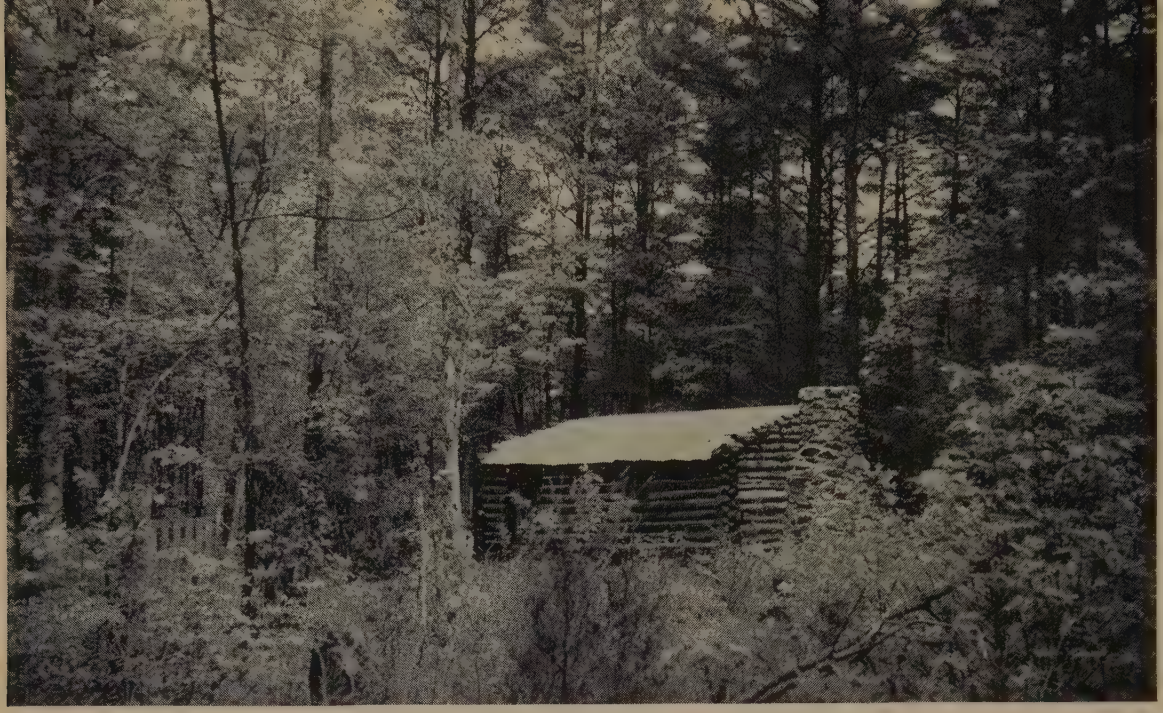
Another possible source of rotenone is the root of a rather common weed known as devil's shoe string. Attempts to grow this plant as a commercial source of rotenone in this country have not been very promising. The rotenone content is rather low and the cost of production is too high.

Another important bug killer is the essence of tobacco—nicotine sulphate. This is a by-product of our great tobacco industry and the supply is abundant. Nicotine is deadly to a number of insects, but is mainly used to clog up the breathing apparatus and to annihilate such sucking insects as the aphids. Nicotine is poisonous to warm-blooded animals, but it is harmless after standing 48 hours in the air.

The castor bean plant, one species of which boasts the glorious name of *Ricinus zanzibarensis*, contains substances that are toxic to certain insects. Some claim that a castor bean plant will repel moles and noxious rodents, but as yet the castor bean is not important as a source of insecticide material.

Although not a vegetable poison, cryolite, a mineral found in considerable quantities in Greenland, is coming to the fore as a substitute for lead arsenate. Since it is also produced synthetically as a by-product of aluminum, the quantity is not limited by ocean transportation. The chemical name for cryolite is *sodium fluoaluminate* and it is quite toxic to a great many worms, beetles and other insects of economic importance, including the codling moth and the Mexican bean beetle. Although not as toxic as lead arsenate to warm-blooded animals, cryolite is not recommended for such crops as beans after the pods form or for cabbage that has started to head.

Many people are fearful of using a real poison, such as lead arsenate, in the home garden. They need not be, for if carefully used according to directions, lead arsenate is perfectly safe to use; for certain purposes it is preferable to rotenone. Remember that in the commercial orchards and truck farms of the country, tons of lead arsenate are used every year and seldom does a case of serious illness occur, and that is usually caused by (Continued on page 48)



"Fernhaven" has weathered for five years and has taken on a story-book appearance. It has also been accepted by the wild folk of the vicinity.

Ingenuity, salvage and healthful hours of work outdoors created a cabin that was—

Ours for Thirty-five Dollars

By GORDON JONES

Our cabin is the result of a sort of evolution that began with pit-caves dug in our home lot in Richmond. The ill-planned, misshapen, packing-box shanty that appeared next was so unpopular with the neighbors that my father paid me a quarter to wreck it. Ten years ago, while I was away at college studying medicine, my parents moved to the old family farm. When I arrived to spend my summer vacation there, I found an attractive house of fieldstone for my use as a laboratory. However, since I was not around to defend my property against agricultural aggression during the following school term, I found a year later that my laboratory was a mere dusty, smelly brooderhouse for countless baby chicks. Out of my dismay came the finally successful propaganda for a log cabin.

We decided to build it in a pretty, mixed woodland —mostly pines with a sprinkling of tulip-trees, dogwood, laurel—with a forest floor matted with running cedar out of which there poked lady-slipper, many-colored mushrooms, Indian pipe, and other plants in their season. In a nearby ravine there is a delightful, cool brook, with masses of ferns stretching well up the hill. Altogether it was a perfect woodland setting.

The cabin we built in those woods, using trees standing about, measures fifteen by twenty feet. The wall is six feet high. This height, together with additional space added by the pitch of the roof, is adequate for the tallest man if only he remembers to stoop a little as he goes through the doorway. The outside, over-all height was increased further by the fact that it was necessary to place the sill-logs (and the floor-logs which lie between them) on a firm foundation of stones to lessen the chances of decay. Also, it pays to be particular in squaring off the foundation logs, and in making them as nearly level as possible by varying the size of the stones.

The sill- and floor-logs were of peeled pine and were the largest we used, being about ten inches in diameter. We placed these logs, which are parallel to the long axis of the house, three feet apart. The floor would probably have been stronger had we used more logs, placing them two feet apart.

It was only after this foundation was secure that we began the walls. For these, also, we used peeled pine poles. But it was not necessary to use any with a greater diameter than six to eight inches. After the logs had been set up in the accepted frontier manner

of fitting notched ends upon each other, both for stability and to reduce the size of the chinks, each was coated with waste motor oil to minimize insect damage. This oil is usually obtainable at no cost from service stations. We have found that it makes no difference in what season the pine trees are cut if the logs are oiled. White oak or cedar logs may be used without being peeled or protected by motor oil.

We waited until the building was complete before chinking it. The material for this—which we used with some doubts—was a fairly stiff mortar to which a little plaster had been added. We are surprised that it held so well, considering the smoothness of the logs. The rough bark of the oak would have offered a considerably more secure base for the mortar.

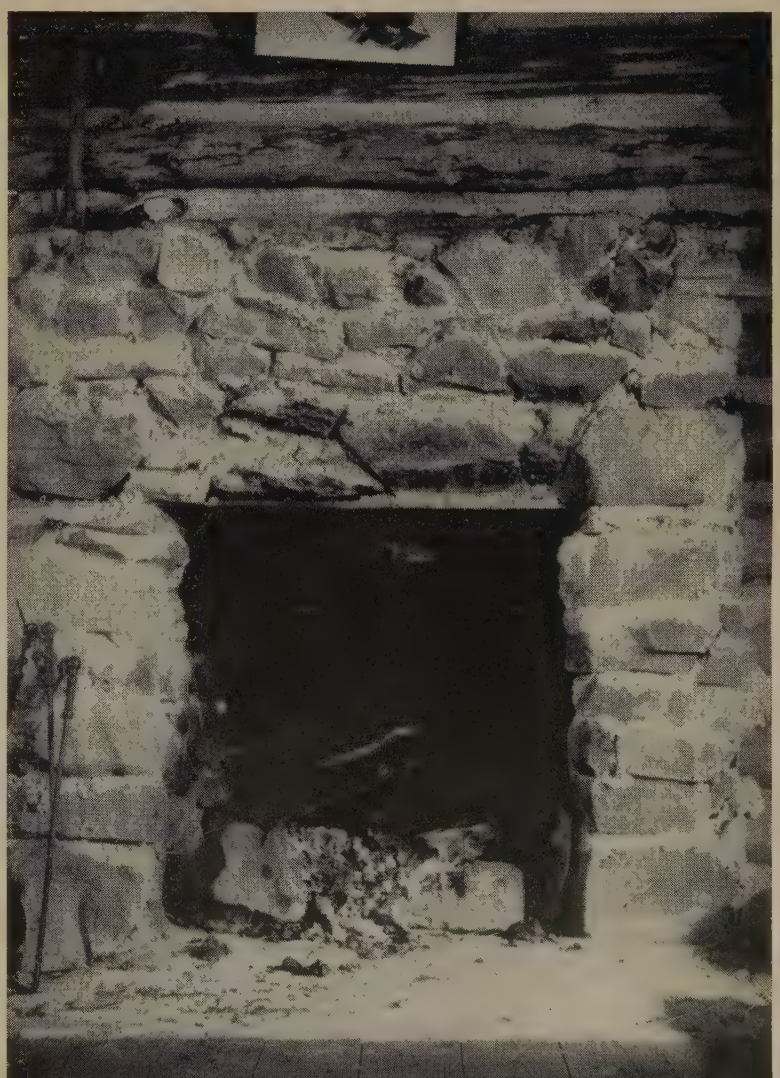
With the walls up, we had a mere pen without an opening, and so the next step was to fashion a doorway. Before sawing this space from the wall, we outlined it by nailing old boards to the surfaces of the logs. These boards served to support the cut-ends temporarily until a door frame of rough pine lumber could be made. Similarly two spaces were sawed in which to fit windows—removed from an old chicken-house—and an opening five by four feet in the lower half of one end of the cabin was cut to admit the fireplace.

The door was made of two thicknesses of rough one-inch pine boards, so placed that one layer of boards was diagonal to the other. A latch was made, on the inside, a short, narrow board dropping into a notched block of wood. In keeping with the backwoods spirit, a leather thong was passed through a small hole above the latch to enable us to raise the latch from the outside. Of course, a good modern lock was bought for the door.

Once these door and window spaces had been cut, it was convenient to attend to the roof. The framework of this was, like the walls, of skinned, oiled pine poles, somewhat smaller than the other logs used. The A of the roof was crudely fashioned by shortening progressively the logs at the gable end, as may be seen in the photographs. The framework was necessarily uneven and presented something of a problem when the time came to cover it. An inexpensive, waterproof roof requires some ingenuity, even when the skeleton is of smooth lumber. We could have fashioned it of tamped clay; but that is dusty and heavy. Slabs bought from a saw-mill could have been used. This, however, would have made a dangerous fire-hazard. The same objection applied to shingles. Tar-paper tacked to strips of boards nailed vertically on the roof-logs might have been a possibility. However, we finally decided to use some old, rather crumpled galvanized iron roofing from a wrecked barn. After we had placed the awkward stuff and filled in the gaps between the roof-edges and the gable logs with cement, we found that light could be seen through a dozen nail-holes! Believe it or not, however, the roof did not leak even during the heaviest rains. Only melting snows caused the slightest dampness inside the cabin.

Our pride and joy, the chimney, was a problem we did not then feel competent to tackle. We knew that in principle one must have a constriction of the flue just above the fireplace to assure a draft. But since theory and practice are two different things, we hired a colored man who is the neighborhood's jack-of-all-trades to build, with my help, a chimney and fireplace of fieldstone that I had meantime collected.

He began the foundation at the assumed frostline a few inches below the surface of the soil, and built up to fireplace level by carefully piling stones and thoroughly filling the spaces between the stones with mortar. One huge, flat rock served as the hearth-stone. It jutted out into the room about eighteen inches. We had to use smaller stones (Continued on page 52)



The fireplace was the only detail for which outside labor was enlisted. It performs well and very little smoke escapes into the cabin. Had he to do it again, the author would make a few changes.

No barbed-wire fence stops the desert as it marches from one field to another, as in this scene in one of the counties of the Texas Panhandle.

Three years before a road had been opened for travel in a southwestern state. Now erosion has taken over in no uncertain terms. It took only ten years to achieve the striking example of gully erosion below. Where the two men stand was once the site of a homestead.

Conservation and War

By WALTER P. TAYLOR

LITTLE reflection is needed to prove that conservation is more important in time of war than even in time of peace. Now, piled high on the observable natural or artificial losses in natural resources are the wartime drafts upon them. And the proper use of the oil, coal, iron, natural gas; the soils, the waters, the forage on the grazing ranges, the forests and the wildlife—not to speak of the human resources which must eventually undergird and employ all other activities—is so important a problem that it warrants a great deal more of attention than we have given it heretofore.

Urgent national necessity—polite words for a threat to the life of the nation—may require the temporary use and perhaps even permanent diminution of certain resources of limited volume. But after the war, all possible energy and attention must be devoted to their recovery.

Unfortunately the books on economics, in academic consideration of the "economic man," have sometimes overlooked the fundamental bases of a good life. But the commonplace but very necessary natural basic resources are as essential to winning a war as they are to making a livable and permanent peace. Perhaps we do not need to worry so much about the rare but vital elements, as tin, manganese, chrome, tungsten, which it is perfectly obvious we must have; but the everyday fundamentals deserve a lot more attention than they have been receiving.

Even before the war started it was obvious to many that processes of exploitation were being carried too far. There is altogether too much evidence that soils are being washed and blown away so rapidly as to seriously threaten man's future; that these same soils are being exhausted by removal of valuable chemicals (used by plants) and then abandoned for other soils, a process that must stop very soon; that man is using up the various important irreplaceable minerals so necessary to modern life at a rate for which there is no excuse, and through processes so wasteful as to put a premium on disaster; that, as regards the so-called renewable resources, including water, grass, forests, and animal life, man (in all too many localities) is changing his environment to a barren waste.

That the desert is being extended in many arid regions of the world is all too obvious, as those who

Shortly before the events of December 7, 1941, at Pearl Harbor, Dr. Taylor contributed an article with the title "Conservation and Civilization." Before it could be published we were at war, and some questions were being raised about civilization itself. So, after some study as to just what to do with this article, we asked Dr. Taylor to revise it in the light of events. He has done so, and in this brief discussion and the pointed paragraphs of "Ding" Darling, are, we feel, words that must be considered by every thoughtful American.

have read Sears' *Deserts on the March*, or who, themselves, have lived in arid or semi-arid regions, have observed to their dismay. For centuries this process has been going on in North Africa, in Asia Minor, in the steppe region of Russia, and in our own West. Encroachment of the desert on more fertile areas may be of greater moment to the welfare of mankind in the future than some of the international political developments that loom so large at the moment.

As man's productive capacity increases—on the farm, in the forest, and in the factory—the stores of raw materials are becoming reduced. No civilization can keep this up without running headlong into disaster. The harder man works along traditional lines of industry the more serious becomes his plight. What a paradox!

I was recently in a certain semi-arid region in a southwestern State. There lies an entire county depleted of its soils. Instead of nutritious and valuable blue grama and buffalo and mesquite grasses there is little besides Russian thistle. The trouble is, the soil that should never have been plowed has been so much disturbed that much of it has blown away. And in a nearby county in the same state the original turf is still being eliminated; 20,000 new acres were plowed in a single year! Apparently demonstrations of disaster on a large scale are all too often lost to us, so great is the capacity of the human mind to resist thought.

Of course, some sort of adjustment of human populations to available resources is essential if a high standard of living is to be maintained. But first the basic natural resources must be available in generous amount.

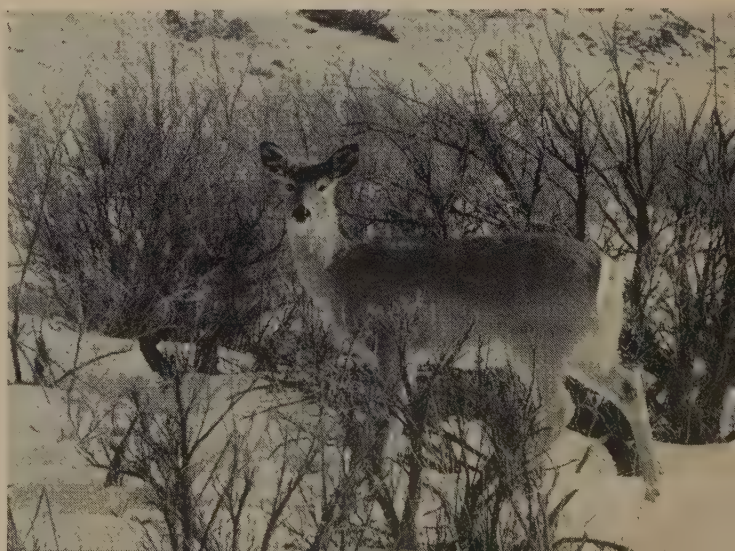
While perhaps little can be done along remedial lines until after the war, it is not too early to think of future needs.

It is obvious that, beginning as soon as practicable, a greater proportion of America's magnificent powers of accomplishment should be applied to the conservation of the foundations of her prosperity. There must be a drastic shifting of emphasis. So far America and England have concentrated on building colossal industries. They must now take increased thought for the conservation of the material bases of their prosperity.

Clearly seen, these problems will be fearlessly faced by Americans with the single objective of the

A sky full of beautiful and graceful waterfowl is a symbol of the interesting world of wild things, whose members have their place in our way of life.

Long extirpated in most places, the beaver is now being restored by the efforts of man and is protected from its earlier fate. The white-tailed deer below is a game animal in many places where protection has increased it greatly. Elsewhere it needs help to exist.

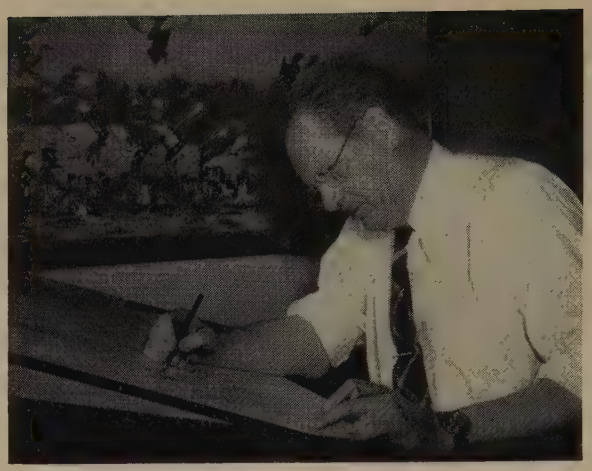


best welfare of all. No selfish and monopolistic individual, no system which permits the spoliation by the few of the material resources on which the many depend, will be allowed to stand. The only question is, will desirable changes be made in time?

Recent efforts toward fact-finding and planning are indicative of some of the national and world policies that are so much needed. Something more than alleviative measures, however, are assuredly called for.

It is now more than ever apparent that the seeming over-production of agricultural crops in the 1930's was a temporary phenomenon, brought about by an ill-advised and unworkable world economic structure. There can be no real over-production in a world where millions are starving.

Obviously isolation is no more justified in this field than in the field of politics. Science and intelligence are the monopoly of no one nation. Ecological needs are everywhere much the same. Over-cutting of forests, over-harvesting of wildlife (game, fish and furs), over-use of grass and other forage, exploitation generally, are as much to be fought, and proper planning and use as much to be sought, in Asia as in Europe, in Australia as in America.



J. N. (Ding) Darling at work at his drawing board. When he is not producing one of his noted cartoons, his thoughts may turn to his avocation, to which he has contributed so much, conservation of natural resources. Of this vital subject, and its relation to war and its causes, he says:

"It took a Jap attack on Pearl Harbor to wake this Nation up to the threat of international piracy. Must we wait for a similar painful lesson in the field of conservation?

"In such times as these, when nine-tenths of the populations of this earth are bathed in blood over the basic question of natural resources to sustain their national standards of living, it is amazing that this Nation, boasting a superior intelligence, should still be apathetic to the cause of eliminating the wasteful practices in soil, water and the natural riches of our Continent.

"Japan couldn't feed her bulging population on the resources within the borders of her domain. Italy was half starving, by our standards, and had to reach for new resources beyond her legal boundaries. Germany demanded new territory in order that her expanding race could be fed. International burglary was only the instrument by which they sought to satisfy their needs for natural resources. We call it a war of dictatorship against democracy and ignore the fundamental pressure of hunger and depletion of human sustenance. More and more people cannot live on less and less any more than more and more cattle can live on a farm that grows smaller each year.

"America can still save itself from a like fate by application of known management principles to our soil, water, vegetation, and wildlife, although the years of criminal wastage and robbing our own heritage of Nature's riches have made the problem progressively more difficult.

"Ye gods and little fishes, when will we wake up and make conservation a national obligation?"

Here are tasks for the greatest leaders the nations can produce, and for all the workers that can be found. The present crisis demands men of as great courage as the pioneers. What are the tasks? Here are a few of them:

Continue to educate and train the people as a whole to new standards of cultural and scientific and ethical living. This is a vital part of the whole program. Americans probably can never get away from our present system of competitive exploitation without a far-reaching educational effort. Seemingly with most adults it will be hard. Our ideas have crystallized. Most people hold the dollar so close to the eye they cannot see the sun. But there is hope in the children, especially those in the elementary grades, under trained leaders.

Strengthen all efforts to devise improved methods of handling the minerals, soils, forage, forests, waters, and wildlife. This means continued scientific research, adequately financed. It also means social rather than exclusively individual administration and use of our common human heritage in materials essential to real living.

Give ever increased attention to the problem of deserts "on the march." Devise systems of land use that will not make deserts, but which, gradually but surely, will increase the beauty and productivity of the land, and keep deserts in their proper place.

Augment efforts to provide for the revegetation of depleted watersheds, so that accelerated soil erosion can be prevented and the force and effects of droughts and floods lessened.

Continue to build up cover and food for wildlife, thereby increasing another great natural resource. Promote augmented production of food in inland waters. Encourage further use of available marine products for fertilizer and food.

While most of us must leave to specialists in other fields the devising of improved social and economic systems within the nations, and the development of essential international cooperation, all of us should join with the two billion other human beings on earth and insist to our leaders that these improvements and developments must be accomplished.

Most of us know the ten commandments, or once

did; but what we might consider as an eleventh commandment has been pointed out by Walter C. Lowdermilk. Here it is:

XI Thou shalt inherit the holy earth as a faithful steward, conserving its resources and productivity from generation to generation. Thou shalt safeguard thy fields from soil erosion, thy living waters from drying up, thy forests from desolation, and protect thy hills from overgrazing by thy herds, so that thy descendants may have abundance forever. If any shall fail in this stewardship of the land thy fruitful fields shall become sterile stony ground and wasting gullies, and thy descendants shall decrease and live in poverty or be destroyed from the face of the earth.

If man's wisdom and determination are brought to bear, there is no legitimate reason why he cannot attain standards of culture, beauty and comfort that will make those of the ancient Greeks pale into insignificance. For the culture of the Greeks was based on a slave population, while the modern man's must be a culture of free men, with machines doing the work of the slaves of former times.

There is so much to be done in research along all lines, in soil saving, range rehabilitation, stopping the onward march of the desert, conserving the wildlife, saving the forests, proper disposition of the waters, building the necessary improvements, rebuilding war-ruined cities and engineering works, promoting scientific and educational centers and good houses for all the people, watching over and improving the people's health and well-being, that there should be no problem of the unemployed for a long time to come. The best machines cannot take the place of the human brain, or of the touch of the competent workman. There need be no depression after the war, there will be so much to do.

The records of history clearly show that a sane conservation program is not an educational fad, or a political frill. It is rather a sober economic necessity. It must not be allowed to become a casualty because of war. Such a fate would mean a permanently lowered standard of living, perhaps a slump into a Middle Ages existence, possibly even the extinction of civilization.

The Pribilofs

By ROLAND RYDER-SMITH

North where the Bering goes, mist curtains rise
On islets all but barren; iron hard cliffs,
Thrust upward at the dawn of time,
Bulk stern above a tumbling, rime-cold sea.
Along the weathered tufa crags, that through
The noons and midnights of unnumbered summers,
Echo the seals' inimitable chant,
The lowering sky is thick with mating wings.

Impelled by what vague, atavistic urge
Sure as the spring, do flippered swimmers come,
To merge their voices with the gull and auk
And guillemot? How have the glossy migrants
Found again these tiny isles—their loved
Ancestral haven-of-the-fogs—without
One guidepost on the heaving leagues of foam,
Or chart by which to steer the furry barque?

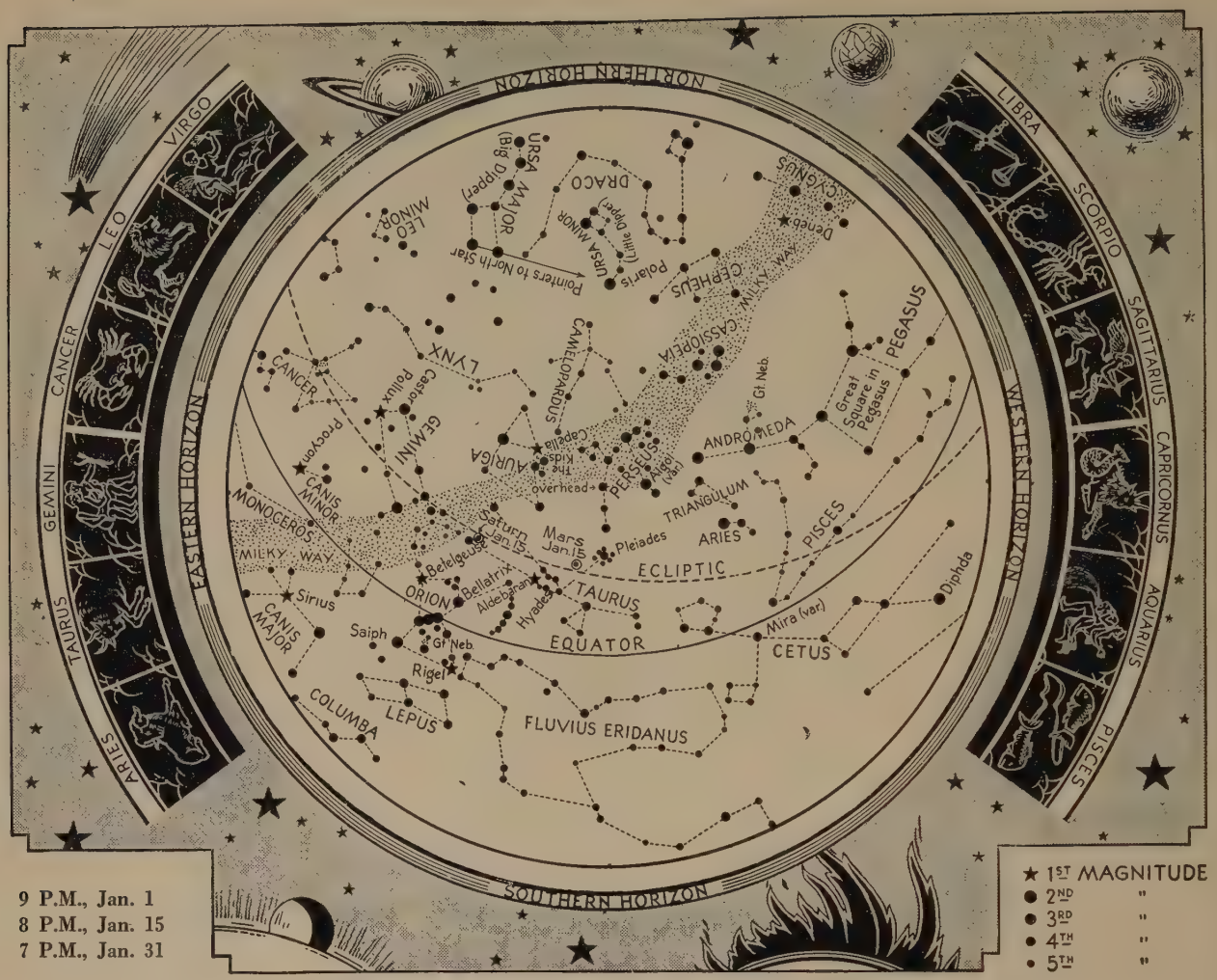
★

Islandia

By WILLARD HALLAM BONNER

It is obvious that one of the principal defects of modern life is its increasing unnaturalness. Man cuts himself off from the soil more and more, and through mechanical devices creates more and more artificial desires that can be satisfied only by more and more mechanical devices. Back-to-Nature movements of various kinds have periodically sprung up. A few individuals have achieved happiness in a return to the soil. But most efforts are fruitless in the face of the great onrushing wave of modern commercial and mechanical "civilization." It would seem that an important book on this subject—containing in great detail a picture of a beautiful and thought-provoking dream-society pictured as successfully resisting a glut of mechanical things and flourishing from the soil—must be widely read and discussed. But such is not the case. Following almost universally exciting reviews, Austin Wright's *Islandia* has dropped into oblivion.

Every Nature-lover should read this big Utopian novel. Any reader who has the slightest interest in making our world more simple instead of more chaotic will find himself completely absorbed. *Islandia* is a novel about an American in Islandia. There the pace of life is that of the seasons. Travel is by foot, by animal, and by boat only. Love of farm, home, and family is strong and deeply-rooted. Tradition stabilizes morals and law. Language is simple because desires are few. People have but a single name, like Dorn. Why have more? Farms are made not only productive but increasingly beautiful by the years. There is a minimum of nervous tension. Good health is not only respected and enjoyed, but from incoming foreigners (if any come in) is demanded. The Islandians live outdoors a great deal. The sky and the wind, the mountains and marshes, the plains and the sea, are close and meaningful. The whole existence in this tenderly ironical novel is an exhibition of a way of life that is intelligent and that is in harmony with, not cut off from, Nature.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south. Time given is Standard Time; add one hour for War Time.

Celestial Events for 1944

By ISABEL M. LEWIS

In 1944 there will be two eclipses of the sun and none of the moon. The first solar eclipse will occur on January 25, and will be total within a narrow path about 80 to 100 miles in width. It will extend from a point in the east Pacific in latitude about 3½ degrees north, longitude 112 degrees west, to a point in Equatorial Africa, in latitude about 19 degrees north and longitude 9½ degrees east. In the first position the sun will rise totally eclipsed; in the second it will set totally eclipsed. The path of total eclipse will touch the coast of Peru in the vicinity of Chiclayo in the early morning. From there it will pass over the Andes into the Amazon valley in Brazil, and will occur at noon in longitude about 49 degrees west and latitude about 7½ degrees south.

The duration of the total phase of the eclipse will be greatest in this part of the path, amounting to about four minutes and nine seconds, which is a more than average length for a total eclipse of the sun. In the early afternoon total phases of the eclipse will occur at Therezina, and at Fortaleza (Ceará) on the east coast of Brazil. The path will then pass over the Atlantic Ocean to the west coast of Africa in the vicinity of Conakry. The southern limit of the path will pass a few miles north of Freetown, in Sierra Leone. A tiny group of islands in the Atlantic known as St. Paul's Rocks lie directly in the path of totality.

This interesting eclipse should have many observers of its total phase in Brazil, Africa, and the Atlantic Ocean, in the air as well as on land and sea, as this is now a much traveled part of the world. The beautiful, pearly light of the solar corona, seen only at

total eclipse, should have long streamers in the equatorial regions of the sun and short, bushy rays over the sun's magnetic poles, like lines of force from a magnet. This is the characteristic appearance of the solar corona during a sunspot minimum period such as we are now passing through.

Although the solar corona is supposed to be visible only during the total phase of an eclipse, at very high altitudes on land, or in planes it may appear some seconds before totality and remain visible for some seconds afterwards. Observers in planes, unless they keep very close to the central line of the path and at comparatively low altitudes above the earth's surface, are likely to find that they are not in the right place at the right time to see the sun totally eclipsed.

Large partial phases of this eclipse will be visible over a large part of South America, all of Central America, the Atlantic Ocean in equatorial regions and the northwestern bulge of Africa. Small phases will also be visible in Florida, along the Gulf of Mexico and southwestern part of North America, and in southwestern Europe. The northern limit of the eclipse region crosses the southern coast of England.

On July 20 there will be an annular eclipse of the sun in which, at greatest eclipse, a thin ring or annulus of light will be visible around the dark body of the moon. This phase will be visible for only 3 minutes and 42 seconds, at the most. The path of the annular phase of this eclipse will run from a point in East Africa across Somaliland and the Arabian Sea to India, passing just south of Calcutta and over the Bay of Bengal to Burma; thence through Thailand and French Indo-China to the South China Sea and Mindanao in the Philippines. The path will pass from the earth at sunset within a few miles of Bougainville in the Bismarck Archipelago, after grazing the north coast of New Guinea. Partial phases of this eclipse will be visible all over the Indian Ocean, Southern and Central Asia, the east coast of China, part of Japan, all of the East Indies, and all of Australia except the extreme southwestern part. This will be truly a War Zone Eclipse, for the annular eclipse and the largest partial eclipses will occur where our forces on land, sea, and in the air are now to be found in large numbers. Only bad weather will prevent the observation of this eclipse by many of our men in far distant lands.

The prediction of the positions of the bright planets for a year in advance is more easily made for the far distant major planets, Jupiter and Saturn, than for the planets inside the earth's orbit, Mercury and Venus. The ringed planet takes about 29½ years to make one circuit of the heavens through the zodiacal constellations. The average extent of one of these constellations along the ecliptic is about 30 degrees, and, as Saturn takes close to 30 years to complete the revolution of 360 degrees, it will advance about twelve degrees a year and may remain a year or more in the same constellation. This is, of course, true to an even greater extent of the telescopic planets, Uranus, Neptune and Pluto, which change their positions very little in a year. Because Uranus is just at the limit of visibility, and may be seen when nearest the earth as a fifth magnitude star, one must know exactly where to look for it. Neptune is a telescopic object of ninth magnitude, and Pluto is several magnitudes fainter. It is for this reason that we confine our remarks and predictions generally to the five brightest planets in the heavens this year.

Jupiter completes one trip around the sun in a little less than twelve years and consequently advances along the ecliptic about 30 degrees a year. It is when we come to the lively little planet Mercury, which darts around the sun in a period of only 88 days, that we have trouble predicting its behavior in advance for an entire year. Venus is a little more sedate in its motions and requires 225 days to complete its revolution around the sun. These two planets, because of their position inside the orbit of the earth, exhibit all the phases of the moon from inferior conjunction with the sun, when the phase corresponds to that of new moon, back to the same position in the orbit again relative to the earth.

Mars takes one year and ten and a half months to make one revolution around the sun with respect to the stars. When nearest to the earth its apparent motion among the constellations is very rapid. When farthest from the earth (Continued on page 50)

Plowboy and the Stars

By PAUL H. OEHSER

[*Discovery by a Georgia plowboy of an iron meteorite weighing nearly a ton, the second largest ever found east of the Mississippi, buried in the red clay of a cornfield, is announced by the Smithsonian Institution.*—News item.]

The earth is such a sly old thing!
Immune to idle questioning
She bides her time, holding an ace,
And strict maintains her poker-face.
Unlike us human so-and-so's
She never tells quite all she knows,
But keeps a-plenty in the bag—
Earth must be something of a wag.
But when a plowboy comes along,
Singing a Suwanee River song,
She opens up, and shows her scars
Made years ago by falling stars.
And some would say she's pretty smart
To take a plowboy to her heart.

The School Page

By E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

GULLIBLE'S TROUBLES

In a recent issue of *Newsweek*, the *Seattle Times* publishes a full page advertisement boasting of the fact that in the Northwest it is claimed that ten new trees are planted for each tree being cut, and giving Seattle as Paul Bunyan's "permanent address." Of course, if the ad is a typical Paul Bunyan story, no one can be expected to take it seriously, but there is little doubt that many who read that page breathed a sigh of relief and merely said, "Well, if they are planting ten trees for every one they cut, why worry about the danger of cutting trees in the national forests and parks." I wonder, however, if any of us would trade one of those giant Douglas firs for ten seedlings? The *Seattle Times* tells us that there are more than ten million acres of mature Douglas fir in the Northwest ready for harvest—"enough to rebuild every home in America"—and everyone who hopes to build himself a new home or remodel his old one immediately feels eager for his share of the crop on those ten million acres.

In the fall of 1943 there was a concerted effort on the part of some interests to log Sitka spruce in the Olympic National Park. This timber was reported as being needed to build mosquito bombers and gliders for the British and ourselves. According to a release of the National Park Service on October 27, 1943, the danger of that threat has largely passed, but if the war continues it may well be renewed.

Unprepared for Nature

Authentic accounts from several sources show that when the United States Army moved on the island of Attu, they used men of the Seventh Division trained in the desert, wearing smooth-soled shoes, with only one change of socks, and without suitable bedding rolls. It is reported that the non-battle casualties, primarily resulting from unpreparedness to meet the climatic conditions, ran more than a thousand and about equalled the number wounded in battle, and was at least three times as great as the number of men killed by the Japanese. How could these conditions have been permitted when we are told that there is a special unit of the armed forces responsible for training our boys to meet the rigors of Nature in the raw? If reports are true, and boys from a thousand American homes were sent to the hospitals or their graves because of their inability to live off the land, is it not just that we ask that our schools provide some of this training before the boys enter the service? Or are we going to continue blindly trusting what we read, or what we are told? Had recommendations made on this page last March been followed, it is hard to believe that the news from Attu in May could have been so discouraging.

Gullible's troubles are not limited to the abuse of our natural resources, or of our soldiers, however. This page has at various times commented on the seriousness with which some of the professional educational testers take their own findings. There is no doubt that the future of many young people these days may rest on the record your sons and mine may make in tests of this sort. We have a right to demand that the tests be valid and that they show that the testers themselves have intelligence. One of the classics to which I have referred is still being recommended for use in high schools, although 20 per cent of the units are factually invalid, and one, at least, asks the child to select one alternative to the statement that the colored parts of a flower are the stamens, petals, pistils, calyx and corolla. A more recent test gives us this dairy farm gem—"What species gives the most milk?" The only accepted answer is "Holstein." The question does not consider the fact that there is a difference between a breed and a species, or whether it refers to the volume of milk produced per individual, at one milking, during a life-time, or during a lactation period. In fact, the question is so full of holes that it is ridiculous to consider it as an adequate instrument of measurement. It is surprising how frequently the members of the gullible group do take such statements seriously.

Election Questions

In this year of elections, we are going to be asked to make all sorts of decisions. Our leaders, and our would-be leaders, are going to promise us unlimited "freedoms", while we are fighting a war brought on in part because we gave various groups in the world freedom to re-arm in spite of agreements, freedom to stimulate populations beyond any possibility that these populations could maintain themselves without taking from the holdings of others. We have given various interests freedom to exploit our non-renewable resources, freedom to give away our resources with no assurance that others will help us when ours are gone. We have allowed leaders to exploit labor at our expense, to tax unmercifully those with fixed incomes, and generally to assume responsibilities such as only a gullible people would permit them to assume. Before we acquire any more freedom, let us get a little self-discipline, and then let us have the confidence to insist that others learn how to discipline themselves and to live within the limit of resources available to them. No worthwhile work in this world is done without disciplining effort. If we bite too freely at offers of freedom, we are inviting trouble. Not a few of these disciplines may be developed in our schools. Some of the teachings of the progressive education group may have to be modified to develop these disciplines, but that does not alter the need.

If we believe that a mature Douglas fir equals ten seedlings in value; that we must stand idly by and send our sons into battle unequipped to meet the hardships of Nature; that we must continue to do this because others have assumed authority over them; if we are going to continue accepting as valid the data supplied us for the last twenty years by the professional testers without making any effort to test their techniques with common sense; if we are to continue to give with complete freedom from our limited resources without any thought for the morrow, then surely we are a gullible people and our troubles are only just beginning.

If we, as school people, cannot begin to take our responsibilities seriously, then I propose that we enter into one of those delightful types of human activity designed to determine not what shall be the national bird, the national flower, the national anthem or the national selection for the hit parade, but what shall be our national fish. If we are to continue to be as gullible as we have been I desire to nominate the sucker as our national fish, doing it with complete confidence that it will win, fins down.

Add Hummingbirds

From Etta Kennedy Brace of Pittsburgh comes another story of foster parenthood of a hummingbird. This orphan was found naked, but bright-eyed and breathing, in the grass. Transferred to a sewing-basket nest, it took nourishment from a thimble filled with honey mixed with water. Although fed several times through the day, little hope for the bird was held out, but next morning it was sitting on the edge of the basket, apparently awaiting breakfast. Offered its thimble of honey and water, it drank eagerly, one wing whirring. The other stuck out at an odd angle, seemingly undeveloped. When feathers came, the bird was an iridescent rubythroat. Perched on a finger or twig, it made the rounds of honeysuckle, foxglove, delphinium and columbine, sipping eagerly. When the long-spurred columbines were too long for the bill to reach the nectar, the spurs were ruthlessly broken off and offered to the waif. Drops of dew were avidly quaffed, and small insects snapped up. When held near a flower that held no nectar, the bird would peck at the finger in protest. The little cripple lived through the summer, but one fall morning was found dead. But it left behind a memory of happy association with a hummingbird.

More Big Oaks

Responding to the query in our November issue about big oaks, G. E. Moore, Chief Naturalist of the Missouri Conservation Commission, reports a bur oak in Meramec State Park measuring sixteen feet, ten inches in circumference at five feet from the ground. The "Big Oak" of Big Oak Park, Missouri, is a bur oak measuring twenty-one feet around. Dr. Moore has been seeking the largest trees in Missouri, and in his search has found a cottonwood twenty-six feet in circumference and an elm twenty-one feet.

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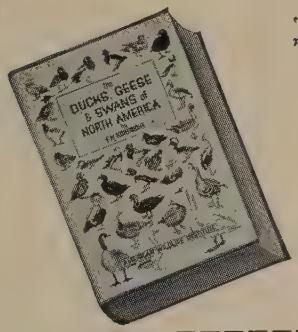

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THE INSECT BATTLE-FRONT

(Continued from page 37)

carelessness.

The proper use of insecticides has a great deal to do with their effectiveness. The time to launch an attack on bugs is when they are young, tender and guileless. A spray—or dust—in time may save nine with such horny-sided critters as the Mexican bean beetle. When the aphids first appear, dash for the dust gun or sprayer and clean them up. Otherwise, these fast-breeding pests will soon be all over your plants and control will be difficult since they like to hide on the under sides of the leaves. Human nature being as it is, however, most growers are likely to wait until the bugs really make a start before attacking them. It then takes more poison to kill them, and more labor, too, and the job will not be as well done as if it had been started earlier.

It is particularly important this year that we stretch our rotenone as far as possible by the use of other insecticides early in the season, and, in fact, whenever they are suitable to use. The root crops can be sprayed or dusted with anything at almost any time. Sweet corn, having a protective husk, can be sprayed for the corn borer, but as the ears form perhaps rotenone is a little safer to use on the silk to keep out ear worms and the Jap beetle. This last pest is one of the hardest to kill of all because he avoids eating anything that looks like poison. Trap him or use a repellent, of which plain lime or whitewash is perhaps as effective as any.

Buy your insecticides early, the trade advises, and likewise do not wait too long to get a good sprayer or duster, if you are lucky enough to find good ones. Containers are another bottleneck with insecticides, much of the supply being packaged in larger quantities for the commercial growers. Study the analysis in fine print, and if it is rotenone get one that runs higher than .50 per cent if you can find it. Rotenone does not deteriorate rapidly if kept in a cool, dry, dark place. If you had any left over from last year do not discard it; use it.

There is the astounding total of 953 brands of insecticides, including a few rat killers and fungicides, on the market. Remember it is what is in the package, and not the fancy name, that counts. I quote from *Insect Invaders,* a new book by Anthony Standen, two verses of "The Bug Catchers' Chorus":

"Baxco, Bim, Bif, Bindarine,
Calso, CopRote, Calogreen,
Flea-Not, Fly-Foil, F. & I.,
That's the stuff will make 'em die.

Cal-Mo-Sul and Carboxide,
Chinchola, Cream of Agricide,
Lafco, Lacco, Loid-o-Lead,
That's the stuff will keep 'em dead!"

IN QUEST OF THE CONDOR

(Continued from page 13)

drifted away. Our hopes crashed. Two condors appeared far up the canyon. They swung over to our ridge and on motionless wings glided down towards us. The first of this pair followed the trail of the bird that had avoided our station before. But the second one came on in a straight glide. Although not one feather was seen to move the bird's rate of progress was amazing. As it was about to cross our zenith we stood up, braced our cameras and aimed. The bird hesitated, then swung in a circle. This is just what we had hoped for. We quickly focused, and released the triggers of the cameras. The shutters clicked at one thousandth of a second. We had photographed one of the rarest birds in North America; the bird with probably the greatest wing expanse in the world —the majestic California condor.

THE CHARLESTON EARTHQUAKE

(Continued from page 19)

badly damaged and delicately poised. Another night without sleep, a night of uneasiness; another day of back-breaking toil and with the return of night, laborers young and old threw themselves on salvaged beds under makeshift shelters, each family on its own premises.

At eleven P.M. on Friday a sharp vibration and panic swept crowds into the parks, there to sit the fourth night through. Peculiarly enough, the first suggestion of regularity in behavior of the earthquake brought with it a measure of confidence. The eleventh shock at the eleventh hour on Thursday, another on Friday at the same hour—certainly this was an omen and there was little disagreement as to its interpretation.

There followed a day of hard labor and that night gathered thousands waited patiently in the parks for the critical hour. Nor were they disappointed—at 11:06 there came a slight but perceptible tremor. That done with, those who could boast of a bed and a fragment of roof prepared to use them in peace that night.

The Charleston Earthquake was over.

Salamanders

Handbook of Salamanders. By Sherman C. Bishop. Ithaca, New York. 1943. Comstock Publishing Company. 555 pages. Illustrated. $5.00.

This is the only handbook covering American salamanders yet published. It describes 126 species and subspecies found in Canada, the United States and Lower California. This roster of the salamanders includes all of those that the author—who knows whereof he writes—regards as validly classified. Each of the species or subspecies is described in a manner useful both for identification of living individuals as well as laboratory specimens, and each is illustrated. Carefully tested keys to identification are provided for the use of people with varying degrees of knowledge of salamanders, thus making the book of the widest possible usefulness. An extensive bibliography provides a wealth of reference material for those who wish to delve further into the life history and distribution of certain species. Dr. Bishop, who is Professor of Vertebrate Zoology at the University of Rochester, has made an immensely valuable contribution in this authoritative and important work.

Forest Quiz

Paul Bunyan Quiz is the title of the latest booklet in the series being brought out by American Forest Products Industries, Inc., 1319 18th Street, N.W., Washington (6), D. C. It uses the questions and answers approach to present facts about our forests, the lumber industry and forest conservation. There are 225 questions and answers in the fifty-two pages of this illustrated booklet, which is well suited for use by teachers or for quiz games at social gatherings. It is available free to anyone who works with wood, or who is interested in the forests.

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"When we study one department of Nature and ignore the rest, we are like a man who, seeing a beautiful painting, throws a cloth over it and then lifts one corner and admires the few inches thus brought into view. We need to broaden our vision so that we can see more of the sublime picture that is in front of us, undreamed of by so many. We need to open our eyes to see the multitude of beautiful and interesting things that are all about us, not forgetting the clouds by day and the stars at night. Thus life becomes fuller and richer and we gain mental and spiritual wealth which we would not exchange for all the gold in the world. Contact with Nature is especially important in these trying days. It brings peace to the mind that is assailed with thoughts of hatred and war. It brings health to the body and makes us more efficient workers. It brings a soothing balm to those who suffer. So let us turn to Nature where we seem to feel the very presence of God."

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WALLAROOS, MOUNTAIN COUSINS

(Continued from page 21)

trainers, to get the timid little wallaroo mother to let me put my hand inside her pouch. I had been cultivating her acquaintance every day for several weeks when one morning I thought I saw something dangle from one of her four teats. It was so small that I thought perhaps the gland had become swollen. Upon closer examination, however, I saw that it was a tiny mite of animated flesh, about an inch long, and apparently weighing less than half an ounce. I was able to check this later, because one of the other mothers had given birth to an infant that lived only a couple of weeks. When she ejected it, I found it and weighed and measured it. It was about one and three quarter inches long and weighed ninety-eight grains.

How the mother is able to pick up the little mite, which is so tiny it has no power of its own, and place it in the pouch is a mystery naturalists have not solved. It would, indeed, be a rare scientific treat to witness the operation. It is my belief, however, that she uses her nimble front feet to pick up the baby and place it in position. Some scientists are of the opinion that the newcomer, through cooperative action with the mother, gets on her long tail, and with that is helped into the pouch.

After birth the infant becomes attached and remains suspended from one of the mother's teats for about three months. During that time no one would even suspect it was in the pouch at all. Periodically, there is a spasmodic contraction of the muscle of the mammary gland and milk is pumped into the baby's mouth. Nature has provided the infant with a special throat apparatus so that it is able to swallow the milk without choking on it, and later, when it is able to eat vegetables, the throat assumes its normal shape.

When the baby finally makes its appearance—at about three months—it is a bright and alert replica of its elders. At this time it probably weighs about ten pounds. In adulthood, two years later, it will weigh nearly 150 pounds—an increase from birth weight of more than 4000 times. I believe this is the greatest increase compared to birth weight of any animal known to man.

For about five months these baby wallaroos are cute little creatures. They remain most of the time in the pouch, but when all is peaceful and quiet outside, they will gingerly hop out and romp and play near their mothers. But at the slightest strange noise, they pop, head-first, into the pouch.

Poor Mama just stands and patiently takes these antics. There comes a time, however, when she becomes tired of it all. Then, when the little one tries to hop in, she loosens the muscle of the pouch and it falls wide open. Down goes baby, head first, to the ground. Somewhat dazed and much amazed at a mother who would do *that* to it, it sets about to manage for itself. On occasion, however, when the youngster is extra good, Mama lets it poke its head back into the pouch for additional dinner.

In the school of hard knocks the young wallaroo learns to provide for itself. In captivity it eats sweet potatoes, yams, carrots, apples and dry alfalfa at the dinner table with the rest of the family. When the offspring becomes boisterous, as any adolescent is prone to do at times, its mother boxes its ears to teach it a lesson in dignity and good manners.

Growing older, the young wallaroo loves to box with its fellow playmates. It stands on its two long hind legs, balance on its tail, and feints and pokes and jabs at its opponent. When any of the attendants at the zoo offer to spar it leaps around with glee. But as it get older, the keepers learn to respect the long sharp claws on the long back legs.

Wallaroos are seldom dangerous, but the big gray kangaroos can be, principally because of their size and consequent physical strength.

CELESTIAL EVENTS FOR 1944

(Continued from page 45)

this motion with respect to the constellations is comparatively slow.

Mercury is too close to the sun most of the time to be seen. One should look for it only for a period of ten days or so preceding or following the dates of its elongations when it is farthest east of the sun, in the evening sky, or west of the sun in the morning sky. The best times to observe it in the evening sky are at the eastern elongations that occur in March and April, when the ecliptic rises most sharply from the western horizon. For the same reason the best times to see it in the morning sky are at the western elongations that come in September and October.

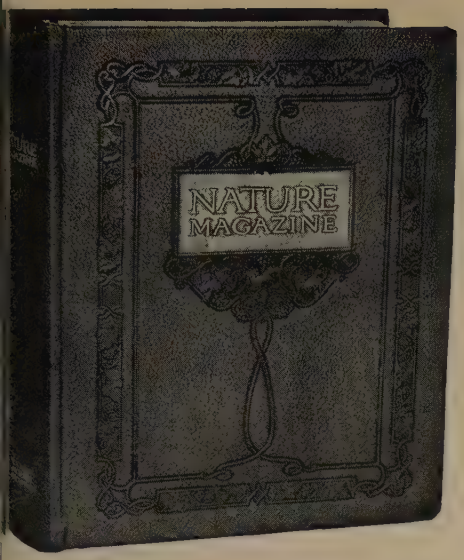
In 1944 Mercury will be seen to the best advantage in the evening near the elongation that will occur on April 12, and in the morning sky near the western elongation of September 22. In January Mercury will be too close to the sun to be seen until almost the end of the month. Its greatest elongation west of the sun occurs on January 31. It is so far south that it will be difficult to find it in the southeast in the morning twilight.

Venus will start the year in the morning sky. It will remain there until the date of its superior conjunction on June 26, when it will pass to the evening sky, where it will be found for the remainder of the year. Venus is always the most brilliant of all the planets. Its greatest brilliancy always occurs about 36 days before and after its date of inferior conjunction with the sun. It is a noteworthy fact that this year there will be no eastern or western elongation of Venus, no inferior conjunction with the sun and no dates of greatest brilliancy. It will remain a brilliant object in the morning sky, however, throughout the winter and spring months.

Mars begins the year in Taurus, near Aldebaran, and appears as a brilliant reddish object rivaled only by Sirius and Canopus early in January but decreasing steadily in brightness during the year as it recedes from the earth. It will remain in the evening sky until the date of its conjunction with the sun November 14, when it will pass into the morning sky.

Jupiter is now in Leo, near the bright star Regulus. It will be in Leo until close to the end of the year, when it will pass into Virgo. On February 11 it will be in opposition to the sun and visible all night. From then on to August 31, when it comes into conjunction with the sun, it will be in the evening sky. For the remainder of the year it will be found in the morning sky.

Saturn starts the year in Taurus in the evening sky, but passes into Gemini in June, where it will remain for the rest of the year. On June 21 it passes to the morning sky at conjunction with the sun, but comes again into the evening sky on the date of its opposition, December 28, when it is visible throughout the night. Saturn's rings are at their widest opening this year and the planet is now a magnificent object in the telescope.



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A WILD RABBIT MEETING

By Kate L. Bloodgood

While camping one summer near Mt. Graham, a high peak of the Pinaleno range in northern Arizona, I witnessed a strange event among the wildlife of the desert—a "wild rabbit meeting." I was advised to keep my cabin dark at night, and watch a nearby open space that had been used, and might be again. I watched anxiously until the moon rose and then could see dark moving creatures.

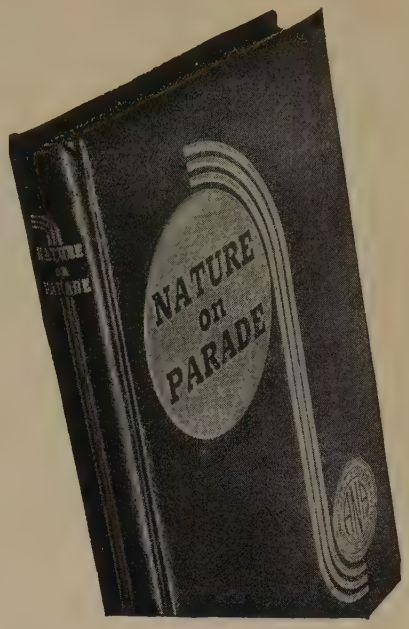
I tried to count but stopped at thirty, for much coming and going, grouping and parting made the task difficult. But there was appearance of a planned convention with committees silently at work. It was the more surprising since I had supposed rabbits to have the least mental capacity of most wild animals.

I watched a long while, forgetting time in the marvel of seeing such a performance. Since that night, I have been told they are not unusual, but that the cause is not known. The final dispersal was as sudden as the beginning, and apparently undirected.

When I awakened in the morning, the occurrence seemed like a dream, or a story told to a tenderfoot. I found the ground completely covered by little foot-prints and not a small weed left standing. It was still difficult to realize what I had seen, for I seemed to have stepped over some barrier between human and wild animal life, and intruded on their territory.

Virginia Bird

In all listings for many years the robin has been presumed to be the official State Bird of Virginia. However, search of the record fails to reveal that the Legislature of the Old Dominion ever placed its approval on the selection. Mrs. J. Frank Key of Buena Vista, Virginia, chairman of the bird committee of the Virginia Federation of Garden Clubs, has set about to remedy that situation. To all clubs she has sent a letter asking them to consider and vote upon a bird they regard as appropriate for Virginia. She also asks for a good bird slogan and a list of birds identified in the vicinity covered by each club. Virginians who are not garden club members should write to Mrs. Key and register their votes.



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OURS FOR THIRTY-FIVE DOLLARS

(Continued from page 39)

for the floor of the fireplace proper.

Side-walls of the fireplace were built by the same process of fitting and mortaring. These walls are one foot thick and thirty inches high. The cavity thus formed was twenty inches deep, thirty inches high and wide, with the rear wall sloping inward at the top to help form the constriction. Two iron bars, found in a junk pile, served to support the stone mantel and the front of the chimney. Above the narrowed part, the flue was widened a little, and the stonework continued to six inches above the ridgepole.

This fireplace has proved satisfactory. Very little smoke escapes into the room and a big fire may

Exterior of the chimney, showing how it was constructed; also detail of the cabin corner.

be built in it with safety. Four properly shaped stones support a removable griddle for broiling steaks. In an antique shop we found an ancient iron pot in which excellent Brunswick stew may be made. And no better coffee could be brewed over coals in the Maine woods. However, cooking in general could have been made far easier by setting a bolt into the stone wall to support a crane.

After the hearth was in place, we made our floor. The floor-logs, as previously noted, were our largest and straightest, but even so there was considerable unavoidable unevenness. And so for flooring we used six-inch tongue-and-groove boards. Thus toestubbing was minimized and wintry drafts from beneath were to an extent prevented.

The following summary and more detailed guide, list of materials we used, and costs of those which had to be bought, may help anyone wishing to undertake a like project.

Tools: Cross-cut saw and good axes for felling trees; carpenter's saw, hammers, hatchet; drawknife for peeling pine logs; trowel, shovel for cement work.

Wood: About thirty-five trees were felled and cut up longer than necessary to allow for overhang beyond notched ends. The sizes were: 20 logs 6″-8″ in diameter, 22′ long; 22 logs 6″-8″ in diameter, 17′ long (these for side walls); 9 logs 5″-6″ in diameter, 22′ long (roof); 8 logs 5″-6″ in diameter, progressively shorter (gable ends); 5 logs 10″ in diameter, 22′ long (sill and floor beams); 350 board feet T&G 6″ wide, $14; 100 board feet, rough, 6″ lumber for door, door-jamb window frames, $2; odd pieces of old boards for temporary supports, fillers on roof and floor-beams, etc.

Roofing: 20 strips of old, buckled, galvanized iron 8′ long.

Windows: 2 sashes from old chicken house.

Miscellaneous: Nails—20 penny spikes to secure logs in notches, assorted sizes for floor, roof, etc., $1.00. Hinges—3 strap hinges for door, $.30; 2 pair hinges for windows, $.10. Lock, $.50. Cement (we used a rich mixture): 4 bags portland cement, $3.60; 1 load sand, $1.00; plaster (we had this on hand); many loads of stone. Total cost of material, $22.50.

The lumber we bought at a nearby sawmill, and, of course, at prices that prevailed before the war. The only labor bill was for twelve dollars for the Negro mason. And we could have avoided this expense if we had trusted our ingenuity.

In retrospect, I realize we made a few mistakes, none of which were serious. For one thing, a cabin ten by fifteen feet would have better suited our needs and—this is important—would have been much more easily heated from the fireplace.

Again, there is too little light from the two small windows; double this number would have been preferable. However, this latter is not too grave an objection if a bright fire of birch and pine logs is kept going.

Lastly, the cabin would have been easier to heat if a simple stone-and-mortar foundation had been placed instead of the occasional stone supports. Also, it is now quite easy for animals to run under the building. My mother wonders when a skunk is going to raise a brood there!

"Fernhaven," as we sometimes call this place of ours, has been weathering now for five years and has the delightful story-book appearance of a trapper's cabin. When there is a rich column of blue, fragrant wood smoke reaching beyond a background of green pines into a clear sky, it is not hard to imagine a man with a coonskin cap returning through the snow after morning rounds of his trap-line.

And the little folk of the woods have accepted the cabin as part of their environment. Last year a company of wasps added to its settled appearance by building a great paper nest on the north end. We were mutually respectful and there were no casualties. Squirrels and dainty white-footed deermice have found shelter inside as proved by cracked walnuts and hickory nuts, and a little nest under a pillow.

Often, on a hot summer's day, an ordinary grayish-brown lizard clatters away down the log wall at the approach of an intruder. And if that intruder is lucky, he may see an iridescent blue-tailed skink dart into a defect in the chinking. Both the common lizard and this latter gorgeous, graceful little creature are quite harmless, and do their bit to make the city seem remote.

To my wife and me this cabin proved more than a mere holiday spot. In a time of gas-rationing and heavy war-time travel on the railroads, we spent our honeymoon there in the lazy still of our woodland, a stillness broken occasionally by the jarring notes of crows and jays during the day and by the lonesome calls of whip-poor-wills and barred owls, and the yap-yap of foxes by night.

Adventuring

You Are the Adventure. By J. Allen Boone. New York, 1943. Prentice-Hall. 223 pages. $2.50.

In this book the author, who has traveled widely as a newspaperman, develops the thought that the greatest adventure is one's self. His philosophy is one that defies discussion in a brief compass, but it is positive and there is much that is helpful to be derived from exploration with Mr. Boone.

A.O.U. Meeting

At the Sixty-first Annual Meeting of the American Ornithologists' Union in New York, James L. Peters of Cambridge, Mass., was reelected president for the coming year. Vice-presidents are George Willett of Los Angeles and Hoyes Lloyd of Ottawa, Canada. Lawrence E. Hicks of Columbus, Ohio, was continued as secretary. A new editor, John T. Zimmer, was chosen, and new members of the Council are Dr. Harry C. Oberholser, Ludlow Griscom and Dr. Alden H. Miller. Dr. Miller was also awarded the Brewster Medal for studies of the junco. Two fellows were elected—Dr. S. Charles Kendeigh of Champaign, Illinois, and Austin L. Rand of Ottawa, Canada.

A Prank of Weather

From Roanoke, Virginia, Mrs. James D. Turner writes to describe a phenomenon witnessed in early June from a cabin in a cove between the Appalachian and Catawba Mountains. An excessive heat wave had been terminated by a severe electrical storm and heavy rain that had finally become a light shower. "Sheet lightning" was almost continuous.

"On preparing to retire," writes Mrs. Turner, "I turned out my light (at eleven) and as I turned to the window I noticed a light pass on the lawn. I saw it was not lightning, and, as I looked, gradually more lights appeared, stayed a few seconds, rose upward and disappeared. So many began to appear that I felt a slight alarm, and called my daughter and small granddaughter. The longer we looked the more numerous the fires became, so, getting really excited, I called my husband, who had retired. I admit he came reluctantly expecting to see a display of fireflies, but he was soon amazed and awed at the eerie sight.

"By this time the entire mountainside of Fort Lewis Mountain was alight with tiny flickering lights. In this amphitheater of the cove the atmosphere seemed to exude a potent wine upon which these spirit lights fed, causing them to dance crazily in every direction and at the same time have a certain sense of stability, as no two ever seemed to collide. I saw as many as four at a time dance in perfect unison, and there were thousands! Some would seem to come directly out of the mountain top and go upward a long way before disappearing. . . Our whole family feels that we had a ringside seat for something out of the ordinary."

NOTE: The Turner family indeed had a ringside seat at a remarkable display of the phenomenon known as St. Elmo's Fire, which is first cousin to lightning. It is an electrical discharge, less violent than a lightning flash, proceeding from pointed and elevated objects in which an electrical charge has been acquired by induction due to the passage of strongly electrified clouds or masses of air overhead. It is not infrequently seen, but rarely in such remarkable display as that the Turners were fortunate enough to witness. EDITOR.

Rabbits

Rabbits, raised domestically, have taken on new significance as food. Two publications have recently come to hand that will assist rabbit raisers. One is a bulletin, *Diseases of Domestic Rabbits*, published as Conservation bulletin 31 of the Fish and Wildlife Service. It is available from the Superintendent of Documents, Washington, D. C., for ten cents. The other is a more pretentious publication entitled *Diseases and Parasites of Rabbits and Their Control.* Written by Marcellus W. Meek, it is brought out by Reliable Fur Industries, 207 Whittier Boulevard, Montebello, California, but neither a letter from the publishers nor the book itself reveals the price.

Bird Poem-Songs

Seven Score Bird Songs. By William Bacon Evans. Boston. 1943. The Christopher Publishing House. 258 pages. $3.50.

From the fly-leaf we gather that this book since 1937 has gathered between its covers more and more poems, expanding through seven editions from thirty-five pages, with the title *Sonnets and Other Verse,* to its present compass. The bird poems took over prominence with the 1938 edition, and dominate with the current one. These verses are interesting and largely successful endeavors to express in poem and word the songs of many birds, together with information about the birds themselves. There is wide variety of form in these poems, much humor and originality of expression. Also there are many sonnets, and, in addition, what the poet describes as "unconventional verse." All in all, the combination makes a most interesting collection of poetry.

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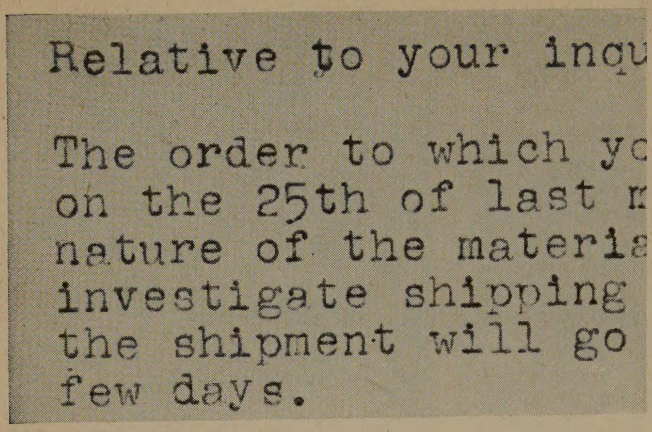

Figure 1.

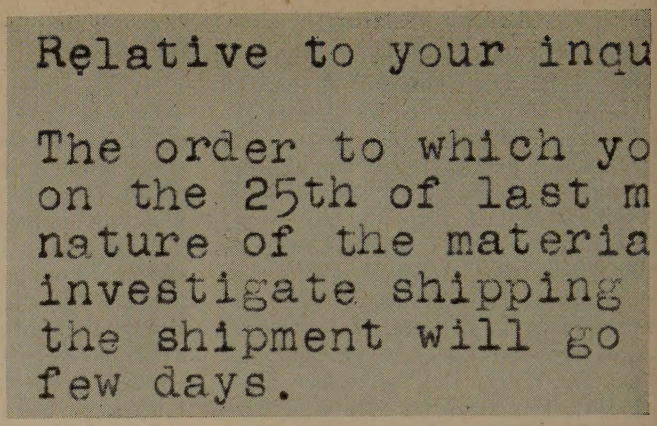

Figure 2.

Under the Microscope

By JULIAN D. CORRINGTON

TYPEWRITER PERSONALITIES

In the world of crime the occasion frequently arises for the sending of some communication—the warning message, the ransom note, the poison-pen letter. Criminals are similar in their psychology to the players of a guessing game detailed in Poe's *The Purloined Letter;* the utterly stupid or foolish law-breaker, in ignorance or disregard of the ease with which handwriting is identified, will pencil his note in longhand. The malefactor a shade above this level, regarding himself as clever, will resort to the typewriter, if one is available, realizing that his script is as individualistic as his fingerprints, but thinking that all typewriting is completely alike and anonymous. The really astute criminal knows that any form of communication can be traced, and that it makes little difference as to the medium selected.

That branch of scientific crime detection dealing with forgery, check-raising, spurious wills, identification of the many forms of communication, and the like, is comprised under the heading Questioned Documents, a large and important division of the whole field. The microscope is an essential aid in this work, although as a rule the regulation compound instrument owned by or familiar to most of our readers is not employed. Most useful of all aids to vision in this case is the wide-field, low-power, binocular microscope, while various forms of magnifying readers and hand lenses are likewise excellent. Microscopists without any such equipment may approximate it by consulting the "Apple Polisher" in this Department for October, 1943.

Occasionally, some elaborate device must be employed, for example the use of a fluorescence microscope with ultra-violet light in detecting differences in composition of inks, either on the written page or from typewriter ribbons. The bulk of this work is, however, simple and routine and will be exemplified in our present discussion by some remarks on the analysis of typewriting. The subject is fascinating and lends itself readily to a number of exercises or games.

In the first place, there are different makes of typewriters, different models of the same make, with designs and improvements changing through the years just as with automobiles, and, in the same make or

Figure 3.

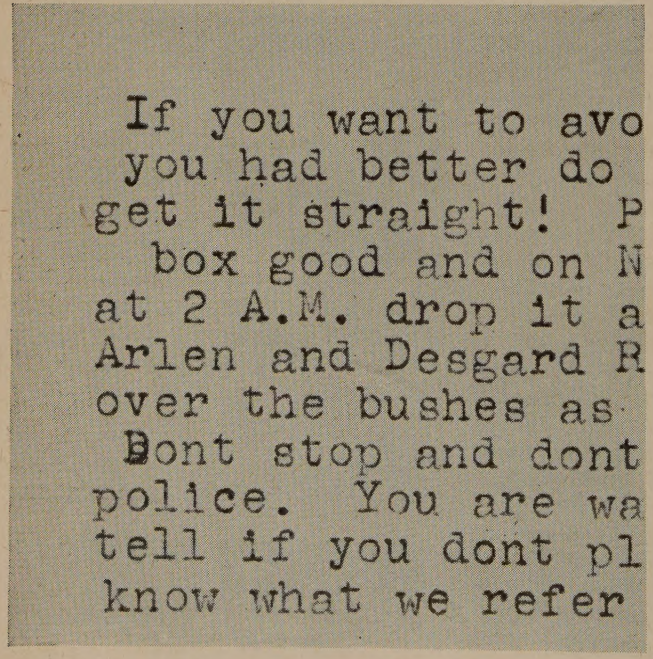
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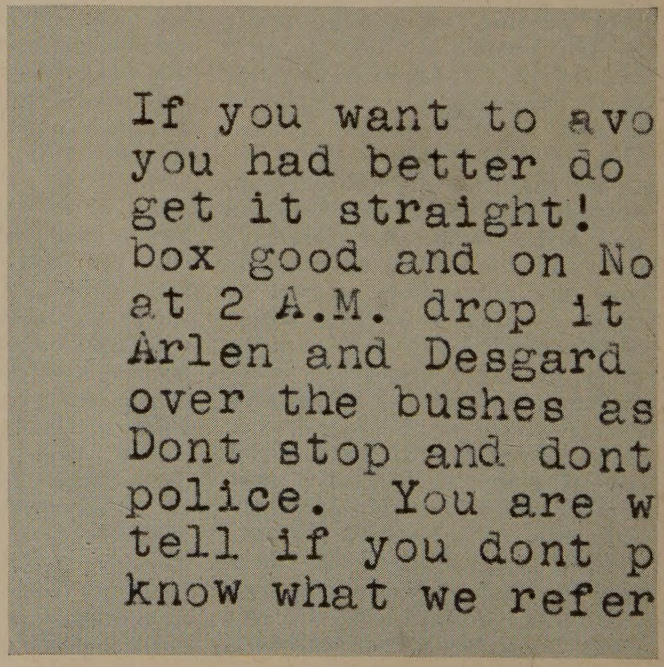
Figure 4.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model, different styles of type. That in widest usage is termed pica, but many customers prefer the smaller elite and a few go in for the larger gothic or the more personal script. In each of these cases the type faces will differ, having been cast at a different foundry and/or from separate dies. The problem of distinguishing between the pica type of Make A and that of Make B is usually extremely simple, the characters presenting obvious differences.

The reader is invited to try the exercise thus far for himself. Type out that celebrated sentence that contains each letter of the alphabet, "the quick, sly fox jumped over the lazy, brown dog", on one make of machine, then right below this line, the same sentence on another brand of typewriter. The illustrations presented with this article provide a more difficult test, in that they were photographed, slightly enlarged, from material typed on two machines of identical make and model.

In the assembly room of typewriter factories, the type bars are set in place and partially adjusted, along with all other parts, then the machine goes to the adjusters or aligners, who work over each bar, seeing that it lines up with all the others, both vertically and horizontally, and that it has the same tension as the rest. When finally inspected, each machine should be theoretically perfect and exactly like all others of the same model. Each type face should be flawless and should strike the paper in exactly the right place and with the same force if struck with a uniform pressure.

However, no two typewriters can be exactly alike any more than can two sets of fingerprints. Slight imperfections in the casting and finishing of type faces and in the alignment are bound to occur, and improper alignment soon becomes accentuated with use; or defects appear that were not present when the instrument was new. When magnified, such very slight differences show up as distinctive and undeniable variations, and positively identify the typewriter on which a document was written.

Careful inspection and comparison of specimens of typing from two different machines, as in copies of "innocent" or test letters shown in figures 1 and 2, reveal certain small but constant differences, some of which are: the "a is a trifle out of vertical alignment in no. 1, being lower than the general horizontal line, designated as the base line; the "r" is slightly above this line in no. 2; the crossbar of the "t" in no. 1, extends slightly farther to the right than in no. 2; the "g" of no. 1 imprints slightly to the left of that in no. 2 so that the spacing between the "g" and adjoining letters is not quite the same in both illustrations; the central part of the "w" in no. 1 is more worn, or is not as elevated, as in no. 2, as it imprints more lightly; the "o" of no. 2 frequently, although not always, inks more heavily on its right half than on the left, showing that the left half is worn or was imperfectly cast; the "o" of no. 1 does not show this at all. It is possible that an investigator might make a mistake in interpreting one of these characteristics alone, especially if the number of individual letters available for study was small; but a mistake when *all* of these, and still other, peculiarities are simultaneously considered, is impossible. Reference: permutations and combinations.

The differences here listed are more easily seen if the illustrations are inspected with a low-power magnifier; space on a page of this size does not permit sufficient enlargement of any considerable area of the messages. Figures 3 and 4 are copies of assumed "criminal" documents, typed on the same machines as nos. 1 and 2, but we will not spoil the fun by stating which of 3 and 4 matches with either 1 or 2. Allowances should be made for discrepancies caused by the typist, especially in the blackness of the characters, due mainly to the force with which a particular key is struck, a highly variable quantity. Often, some of the letters are clogged with lint from the ribbon, presenting smudge patterns that are characteristic, especially true of closed parts of letters, such as a, b, d, e, and others. The two machines used in the present instance must have been new or freshly cleaned, as they show little evidence of this sort.

If you are a member of a group that might enjoy working out a problem of this nature, type an "innocent" note, with exactly the same wording and spacing on several different typewriters, as many as are available, on different cards and designate the cards by a code number on the back. Then type a "ransom note" on one of these machines, identity known only to yourself, or any referee appointed by the group, and see how many of the players can find the matching card among the "innocent"

Background for the Microscope

Equipment for the pursuit of microscopy may be as simple or as elaborate as individual inclinations dictate; but there is one item wholly indispensable —*books!* The microscope is handmaiden to all the sciences, and those who follow its adventuresome trail must have many a guide to direct along the right path.

Here is NATURE MAGAZINE'S selection of best bets. Check your library and add those that fail to answer the roll call. Buy one each month, or as often as you can. Suggest them as gifts. Buy them for the relative or friend whose chief joy is working with his microscope. Entries will be changed periodically; here is a basic list for a starter:—

MICROSCOPE

The Microscope, by S. H. Gage; 17th ed., most celebrated American work; very thorough.....$4.00

The Microscope, by R. M. Allen; Excellent new manual.....$3.00

MICROTECHNIQUE

Working with the Microscope, by J. D. Corrington; New guide for self help or classroom with graded series of lessons, from single to advanced. $3.50

Adventures with the Microscope, by J. D. Corrington; An informative and interesting text for the younger hobbiest or biological student...$5.00

Animal Micrology, by M. F. Guyer; Best general guide for histology and zoology at the college level....$2.50

The Microtomist's Vade-Mecum, by A. B. Lee; Encyclopaedic reference, standard, advanced; botany and zoology.....$9.00

PHOTOMICROGRAPHY

Photomicrography, by R. M. Allen; Splendid new work by recognized authority; complete; fully illustrated.....$5.50

BOTANY

Textbook of Botany, by Transeau-Sampson-Tiffany. Beautifully designed, readable, recent.....$4.00

ZOOLOGY

College Zoology, by R. W. Hegner, Fifth Edition; most successful work of its kind; gives all main animal types and their structure.....$3.75

Animals Without Backbones, by R. Buchsbaum. Fascinatingly written and illustrated; new style invertebrate zoology.....$5.00

Man and the Vertebrates, by A. S. Romer. Companion volume to preceding; excellent general survey. $4.75

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notes. Other similar projects can be devised. They are useful in teaching painstaking and close observation of detail, as well as interesting and amusing.

Yes, typewriters have personalities. One of our A.S.A.M. members, as previously reported in these columns, called his machine "Elsie," and was wont to complain to us, when his letter contained many errors, that "Elsie wasn't feeling well today." But whether your desk pet is Elsie, or Maud, or Celeste, she will have her individual idiosyncrasies, as distinctive as the physical traits of her owner or operator.

A. S. A. M. NEWS AND NOTES

The following letter, received from a private in the U. S. Army Air Forces, is typical of many that come to us from all sections of the country and from abroad. We believe it of sufficient interest to our readers as to merit reproduction, in part, in these columns.

"A short time ago I picked up a copy of NATURE MAGAZINE in our day room. Much to my surprise and delight I discovered your highly interesting department, 'Under the Microscope.' What excited me still more was the space allotted to A.S.A.M. news never dreaming that an organization devoted to the interest of amateur microscopists existed. I am anxious to know what qualifications are necessary—

"My interest in this field is one of long standing. However, until some three years ago, when it became financially possible to purchase a first rate instrument . . . I relied upon the medium of the public library, catalogs, inferior equipment, and no little imagination to satisfy my curiosity of the 'world infinitesimal.' . . . It is my ambition, some day, to study seriously the science of bacteriology.

"Often have I envied the well-established, fraternal societies of the English, offering opportunities for the exchange of ideas, solving common problems, enjoying field trips together, etc. Having pursued this avocation more or less alone, it should be readily understandable that realizing the existence of the A.S.A.M. has been something of a 'shot in the arm' to my interest in microscopy, and to future endeavors.

"At the moment I'm a valetudinarian in a base hospital, recumbent in bed. I would appreciate any literature pertinent to the subject—they would be a great help toward relieving the boredom of a rather inactive, prosaic existence. In closing may I express the sincere hope that the Society may continue to prosper—consolidating into a strong, deeply rooted fellowship, dedicated to the interests of the American amateur microscopist."

REVIEWS

Technicians in either botany or zoology who are interested in the chemistry of staining and who wish to understand this process in greater detail or to experiment with some of the many new dyes, should secure a copy of *Stain Technique*, by Dr. W. H. Emig, of the University of Pittsburgh. This admirable work discusses biological stains as derived from commercial textile dyes, takes up details of their chemical and physical actions, classifications by the C. I. (color index) system, uses, procedures, and then catalogs 188 dyes, including a great many that the average biologist has never heard of, listing their properties and uses. Over 80 double, 20 triple, and 15 quadruple staining combinations are included.

Staining becomes a rational rather than a hit-or-miss performance when guided by the principles here given. We venture to state that this book will become a pioneer guide to many who will wish to launch out into the widely open field of experimental staining with synthetic organic dyes. p. 75; flexible fabrikoid covers, wire binding. Published by the author, Pittsburgh, 1941. Order from the author; $1.00.

Textbooks come and go, and few are those so successful as to span a whole generation. One of the most celebrated of these few is Hegner's *College Zoology*, the new fifth edition of which is being used by professors who, as students, cut their scientific eye teeth on the first or second editions. The general arrangement, following the forms or types system, remains, but the work is notably enlarged and revised. Each of the animal phyla is considered in turn, using a standard type for details, then making briefer comparisons with others in the same group. New features include eight color plates by R. Bruce Horsfall to bring out such principles as age, sexual, and seasonal color variations, protective coloration, and the like; the accounts of protoplasm, insects, and physiological processes have been expanded and brought up to date; parasitism has been transferred to the chapter on ecology, and the last section, on principles, has been greatly expanded.

The emphasis on taxonomy has been subordinated. Earlier editions may prove more useful as references, but the present one appeals to us as a better book for teaching general zoology along current lines of college courses. One of the commonest complaints regarding stress of biological principles is that students who complete the course know quite a bit about vitamines, development, or chromosomes, but know practically nothing at all about the animal kingdom as a whole or of classification. The fifth edition of Hegner seems to us to strike the happy medium more ideally than before and to present both sides of the picture as adequately as possible in a book designed for a full year course. By the same token, this is a splendid book for the independent student or general reader. A wealth of fine illustrations adds greatly to the reader's enjoyment and his ability to visualize the written matter. Pp. xx, 817; 8 color plates, figs. 441. The Macmillan Co., 60 Fifth Ave., New York, 1942. $3.75.

WINTER BUDS

At this season, take advantage of your opportunity to secure some tree buds and dissect them. Note the heavy external coating of waxy resins on the outermost scale leaves, the bud's protection from mechanical or insect injury, loss of water, and freezing damage. Peel off these scales, one at a time, and expose the soft part within, noting each structure in turn. There will be leaf primordia if the object is a foliage bud, or of flowers if a floral bud. Apple buds enclose both kinds of primordia. Use a hand lens, dissecting microscope or the lowest available power of your compound instrument and, with the aid of a textbook of botany, work out all of the parts enclosed in the bud. You'll find it a veritable Pandora's box.

CHECK YOUR SPELLING

Among words which microscopists and other science students commonly misspell are these: have you been committing mayhem on any of them?—lens (not lense), focusing (one s), labeled (one l), nucleus, embryo.